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The Geographical Journal

Vol. LXVI No. 4 October 1925

OBSERVATIONS ON THE ROCKS AND GLACIERS OF MOUNT EVEREST

N. E. Odell, A.R.S.M., F.G.S.

Read at the Afternoon Meeting of the Society, 18 *May* 1925. *Map follows p.* 384.

IN April 1922 Dr. Heron read to this Society an admirable paper (*Geo. Jour.*, vol. 59, No. 6), on the geological results of the first Expedition that he accompanied as official geologist. That paper gave an outline of his strenuous activities in the area lying to the north of Mount Everest, and his work was, as he himself has said, "virtually a continuation to the westward of Sir Henry Hayden's pioneer investigations during the Tibet Expedition of 1903–4." Heron's work was largely concerned with the sedimentary rocks that comprise the area to the north of the great belt of crystalline rocks developed along the main axis of the Himalaya. Time did not permit of his making more than brief flying visits, so to speak, to the crystalline zone, and he had hoped, on the next expedition, to study the crystalline area in detail. However, in 1922 and again in 1924 political objections were raised to the presence of an officer of the Geological Survey of India, and so the opportunity of much valuable work on the great problems of the uplift of the Himalayas, in a region hitherto inaccessible, had to be sacrificed. I was merely a member of the climbing party and oxygen officer. But it could hardly be expected that a geologist by profession, however occupied with the numerous other duties appertaining to the expedition, would keep his eyes closed to all the features of the landscape for the five months during which the expedition lasted. And it is the results of those observations and a few of the conclusions drawn therefrom that I propose to put before you. The paucity of the results I am only too well aware of, but preoccupation with the oxygen apparatus for use on the mountain, which necessitated continual work on it during the whole of the outward journey, as well as the time spent in the attempts on the summit, and all that this primary object of the expedition involved, quite prevented much detailed observation.

PART I. THE ROCKS.

I propose at the outset to skip over any observations I may have to record on the younger sedimentary rocks, of which the vast elevated plateau of Tibet is predominantly formed. I have scarcely anything to add to the work of Sir Henry Hayden and Dr. Heron on these formamations. My observations are principally confined to the crystalline and metamorphic zone of the main chain of the Himalayas and their associated rocks, the so-called "Metamorphic Complex," and may be considered as supplementary to those made by Dr. Heron more especially up to the northern border of this zone. I was able to penetrate well into this zone in two localities in particular, that in the neighbourhood of Mount Everest itself, and that of the Rongshar and Gaurisankar about 40 miles to the west. But in neither case had I the opportunity of extending my investigations very far laterally, that is to say, east and west of these southward lines.

The Mount Everest Region.

In trekking southward from the town of Shekar Dzong *en route* to Mount Everest, the crystalline rocks first make their appearance in the valley of the Dzakar Chu at the point where the Gyachung Chu comes in from the west. The path to Rongbuk leads along on the true right bank of the Dzakar Chu, and apart from an interesting occurrence above the Chöbu monastery recorded by Heron, one first strikes the main mass of the crystallines at the above river junction in a great cliff overlooking it on the eastern side. It is composed of dark horizontally banded biotite gneiss alternating with bands of light granite, though in the upper part of the cliff the latter is represented by pegmatite, and the whole appears to represent a large-scale example of "lit-par-lit" injection. The section showed a predominance of gneiss towards the top of the cliff. The gneiss itself shows an alternation of biotitic and felspathic bands, and this strongly foliated type is essentially non-porphyritic. The important question of the relation of this crystalline mass to the limestones that rest on it near the summit of the bluff will be dealt with later.

As one proceeds up the wide valley of the upper Dzakar Chu past the village of Rongbuk this same strikingly banded series continues on either side, often forming steep cliffs, especially on the east side of the valley, with inevitable talus slopes at their foot. Near Za-Rongbuk is a section close to the path showing clearly the biotite gneiss invaded and cut clean across by bands of pegmatite, indicating the younger age of the latter.

A far-flung head-tributary of the Dzakar Chu enters the main valley from the east not far from the snout of the Rongbuk Glacier, and here in the gorge it has excavated I found a most interesting section through the banded gneiss and its associated rocks. Persisting in its horizontality for the most part, the former was again seen to be intimately mixed up with the light granite, which invaded it both along the planes of foliation

and also right across them. This granite was pinkish in colour, contained tourmaline and garnet, and being poor in white mica frequently graded off into pegmatite. The biotite gneiss also was here notably garnetiferous. Isolated lenticles of the pegmatite within the gneiss were sometimes apparent, and that the whole had been reduced to a state of fluxion at some time in its history was evidenced by veinlets of the biotitic rock running off into the pegmatite. The gneiss on the whole had only local contortions, but at one point in the gorge a fault block had been turned through 90°. Higher up in the gorge occurred a very coarse porphyritic granite or pegmatite with large phenocrysts of muscovite and tourmaline, often 2 or 3 inches across. Resting on the latter was a large mass of hard green variegated limestone, thoroughly crystalline, containing much epidote where the pegmatite had invaded it. The relation of these limestones to the overlying gneisses was unfortunately obscured by slopes of scree. In this gorge, which I tentatively dubbed the "Hermit's Gorge," owing to the existence of a lama's retreat near its entrance, I was also interested to find pebbles of grey limestone, evidently washed down from the parent bed (Permo-Trias) away to the east, but time did not admit of my ascertaining this.

Another locality that was examined in some detail was the steep face overlooking Camp I. on the north by the snout of the East Rongbuk Glacier. Here was again found thoroughly metamorphosed and crystalline limestone resting on the schorl granite, which sent off apophyses into it. Above the limestone, which had perhaps an apparent thickness of about 100 feet, was the banded biotite gneiss associated with other metamorphic rocks appearing conformable upon the limestone, and looking more than ever like a bedded sedimentary series.

The same succession extends southward to the head of the East Rongbuk Glacier, giving the impression of a practically undisturbed stratified series. Near Camp III. an exposure at the end of the eastern spur of Changtse showed the same metamorphic series, though without the limestone, garnetiferous biotite schist being predominant, and the whole mass permeated with pegmatite. Southward across the névé basin of the East Rongbuk Glacier the series appears to continue in the lower part of the north-east ridge of Mount Everest itself, and the marked junction it makes with the overlying banded biotite gneiss is nowhere better seen perhaps than from Camp III., though bad weather and snow-covered rocks prevented my examining this junction in detail. A noted fault and anticlinal flexure of the beds is seen also from here.

The rocks of the North Col vary from dark very fine-grained biotite gneisses to hornblende and tourmaline rocks, dipping northward at 29° to 30°. As one proceeds up the north ridge of Mount Everest the rocks change from the more silicious varieties found below to others decidedly calcareous in composition. At about 24,000 feet there was some slight evidence of an unconformable junction between the silicious

and calcareous facies, but owing to the rolling of the beds and the general dip outwards (*i.e.* north) of approximately 30°, the gradient of the ridge itself being here about 35° to 40°, together with the extensive screes, it was impossible to determine this precisely. It is of course this particular characteristic of the north face of Mount Everest, namely, the outward sloping overlapping slabs with their numerous "reversed scarp" faces, that makes the ascent so awkward, though not strictly difficult. The rocks moreover are not on the whole rotten, since they have been considerably indurated.

I do not propose here to describe in detail all the petrographical types met with in the upper part of the mountain: suffice it to say that they consist predominantly of dark calc gneisses, light limestones, and sandstones. Specimens brought back in 1922 by the high-climbing parties and examined by Dr. Heron, were diagnosed by him to be calc-silicate rocks for the most part, but unfortunately he was led badly astray in regard to one important zone. I refer to the light brown band of rock that extends so prominently from the north-east shoulder right along into the base of the final pyramid. Geologists should be the last people to depreciate assistance rendered by amateurs. Nevertheless the latter are apt to lead one astray in such matters as the exact localities at which material has been collected, and especially in regard to the predominance, or fortuitous occurrence, of any specimens collected. The party that reached the above light band of rock in 1922, brought back a specimen from it that Heron examined and found to be a schorl moscovite granite. I reached this belt of rock myself last year and found it to be undoubtedly formed of calcareous sandstone, which incidentally is at times micaceous. Now the whole metamorphic series of which Mount Everest is composed is intruded by the light schorl granite and pegmatite, which breaks across the bedded rocks in conspicuous dykes and veins here and there, having come up through the subjacent biotite gneiss. This intrusive granitoid rock is very insignificant in amount relatively to the sediments, and occurs quite fortuitously. The simple explanation of the anomalous find of 1922 is that if it were definitely made at this light belt of rock at over 27,000 feet, it was plucked from a chance occurrence of the granitoid rock within the sandstone. Consequently, I fear the view expressed by Dr. Heron that this supposed sill of hard granite is the main factor in preserving the prominent north-east shoulder, as well presumably as the main peak, is no longer valid.

The final pyramid of the mountain is composed of a dark calc schist containing quartz and biotite, very fine grained and compact, which extends also some distance along the north-east shoulder as a cap rock to the above-mentioned sandstone, and this may in some degree be contributory to the pre-eminence of Mount Everest. But, in my opinion, other and more cogent factors, causes predominantly tectonic, must be

WEATHERED STACK OF BANDED GNEISS AND GRANITE, ALSO OLD MORAINE TERRACES ON FURTHER SIDE: RONGBUK VALLEY

DARK BIOTITE GNEISS WITH INTRUSIVE VEINS OF WHITE PEGMATITE: ZA-RONGBUK

BANDED GNEISS (DARK) AND GRANITE (LIGHT): RONGBUK VALLEY

BIOTITE GNEISSES RESTING ON LOWER CALCAREOUS SERIES (LIGHT): CAMP I.

CLIFFS OF THE NORTH-EAST SHOULDER OF MOUNT EVEREST, SHOWING DISLOCATION AND FLEXURE OF BEDDED BIOTITE SERIES

sought for a full explanation of this pre-eminence. The extra height of the final pyramid, however, would appear to be due to a fault of small throw bounding its eastern side, the line of which marks the pronounced couloir that was reached by Norton on the occasion of his recent ascent.

Looking from high up on the north face of Mount Everest, I had the opportunity in intervals of good weather—which when I was there were all too infrequent—to observe the continuation of the Everest sedimentary series northward in the North Peak (Changtse). The upper part of the latter is obviously composed of the Everest calcareous series, resting on the bedded biotite gneiss, profusely veined with the light pegmatites. The junction of the two series is most marked, owing to the colour difference, and is straight and regular. This is vividly shown in Somervell's wonderful photograph taken from 28,000 feet, where one is looking down the dip-slope of the series. The true nature of this important junction it is difficult to tell, but it has the appearance of being a disconformable one, though one is apt to be deceived by the foliation as well as by the irregular veins and sills of pegmatite, which however are mostly confined to the dark gneiss below. The further extent of the upper calcareous series is seen in the upper parts of the higher peaks, such as Khartaphu to the north-east, and probably Gyachung Kang to the north-west; but the lower peaks are mostly of the lower biotite series, the prominence of many, no doubt, being partly due to their being fortified by the intrusive granites and pegmatites.

The marked extension almost horizontally of the west ridge of Mount Everest itself is due similarly to its being composed of the more resistant biotite gneisses, the softer overlying calcareous rocks having been here eroded away.

In the region of the West Rongbuk Glacier, which was visited by Hazard to extend the topographical survey, I understand there are representatives of most of the afore-mentioned metamorphic rocks, and these are in their expected positions relative to one another.

The Rongshar Region.

The Kyebrak glacier, which flows northward between the lofty Cho Uyo and Cho Rapsang, occupies a valley which in its lower part is bordered by cliffs of the same series of banded biotite gneisses as exist in the Rongbuk valley. Beneath these I found at several places the same metamorphosed sediments, in particular limestone, as obtained below the banded gneisses of the Rongbuk. These series were all well veined with pegmatites. In the neighbourhood of the Phusi La, that leads over into the Rongshar Valley at an altitude of just over 17,000 feet, I found umistakable representatives of the upper Everest calc gneisses. These I first identified in the northern spurs of Pt. 18620, which is a northern outlier of Cho Rapsang, and saw that they also extended all

along the top of the range bordering the west side of the Kyebrak glacier, both north and south of the Phusi La. I also found cliffs of limestone and calc-gneiss well over on the southern side of the pass. These were succeeded below, as was to be expected, by the banded biotite gneiss series. In dropping down the upper part of the Rongshar, my notes record a gradual change from the horizontally banded and foliated gneiss of the northern side of the range to the much more knotted and contorted gneiss that extended throughout the lower parts of the gorge. This latter gneiss was recognizable of course as the typical Himalayan "Augen Gneiss" that forms the core of the whole extent of the range, and which has been so often described from numerous localities. It is almost unnecessary for me to repeat here that its truly intrusive character was long ago proved by the late Gen. C. A. McMahon.* Both in texture and structure the contrast between this augen gneiss and the intensely foliated biotite gneiss could hardly be greater, though I cannot here go into the essential points of difference

The junction and relationship of the two in the upper Rongshar I was unable to determine with any precision, either owing to inaccessibility or the obstruction of talus and moraine, but it would certainly appear that the augen variety were the younger and intrusive facies. I might mention that Heron, from what he saw in the Kharta valley and elsewhere, was obliged to leave the question of relationship undetermined. In the lower Rongshar the general dip of the augen gneiss appeared to be from 25° to 30° North, and this persisted right into Nepalese territory. Near Tasang and lower down at Chuphar appeared schists and other metamorphic rocks, including limestones—one more link, can we say, in the chain of evidence for an ancient sedimentary series, that may represent, as Hayden and others have supposed, a distant "inlier" of one or other of the Archean systems of the Indian Peninsula. Throughout the Rongshar region the typical schorl granite was again seen with its associated pegmatite, cutting across everything and exhibiting in places such extreme fluidity that parts of the gneiss into which it had been intruded were floated off during its injection.

Prof. Garwood, during his classic journey with Dr. Freshfield round Kangchenjunga,† was not able to find definite evidence that the pegmatites of that region were younger in age than the Himalayan gneiss, but thought that the former might be apophyses of the gneiss. In the Rongshar to the west, at any rate, the relation is unmistakable; that the pegmatites are the younger, though probably not by very much, since at places broad bands of pegmatite lie "bedded" almost horizontally with the augen gneiss, and give the appearance of having been rolled out with the gneiss during movements subsequent to the latest intrusions.

* *Records of the Geol. Survey of India*, vol. 15 (1882), p. 44; vol. 16 (1883), p. 129; and *Geological Magazine*, Decade iii., vol. 4 (1887), p. 215.

† Garwood in 'Round Kangchenjunga,' D. W. Freshfield p. 292.

As to the structure of Gaurisankar itself, I was never able to see it sufficiently clear of cloud or snow to be able to make out the nature of its upper part, but its lower rocks appeared to be of typical Himalayan ortho-gneiss much fortified with pegmatite dykes.

Permo-Trias Limestones.

Before attempting to base any conclusions upon the similar metamorphic suites of rocks of the two districts visited and described above, I propose to deal briefly with the series of limestones that Dr. Heron found running along the southern border of the vast extent of Jurassic shales of the Tibetan Plateau, and which are wedged in at places between these folded shales and the metamorphic rocks of the crystalline complex. These were found by Heron to be a uniform assemblage of unfossiliferous limestones with shaley partings, all fossils having been destroyed and now appearing supposedly as streaks of crystalline calcite. But in one locality a prolific fossil fauna of Productus and Spirifer was found, indicating a probable Upper Permian age for the limestones. The Jurassic shales appeared to be lying conformably on these limestones. Now Hayden was of opinion, from his researches in the country to the east, that the Jurassic shales represent the upper part only of that system and are the equivalents of the Spiti Shales, and that the lower (Lias) beds, as evidenced around Phari in particular, consist of various slates, quartzites, and limestones, the lowest of all being a brachiopod limestone, whose fauna indicated either Liassic or possibly Rhaetic age.

Professor Garwood found an interesting crinoid limestone in Lhonak on the northern border of Sikkim, which in spite of earlier faunistic difficulties Hayden has shown to be very probably Jurassic; these difficulties, incidentally, were on account of its apparent equivalence to the crinoidal limestone found by Sir Joseph Hooker on the north-eastern border of Sikkim, and thought by him to contain nummulites and to be therefore Tertiary in age.

But Hayden has shown the fallacy of this, and the extreme probability of its also being Jurassic and in particular Liassic. All these fossiliferous limestones along the northern border of Sikkim appear therefore to be coæval, and it is not until we get into the region of the Dzakar Chu to the west, where Heron found his Permian or Lower Trias limestone in a corresponding position with regard to the crystalline rocks, that difficulties of correlation arise. Briefly, it would appear that if the Upper Jurassic (Spiti) shales are resting upon the productus limestone, then a large series of rocks, referred by Hayden to the Oolite and Lias stages, has been cut out, although Heron at this point says the shales seem to rest normally on the limestones. The point is of interest, since to the west of the Dzakar Chu and extending much further west beyond the Lamna La, I found a large series of limestones overlapping on to the crystallines to the south and brought up against the shales on the northern

side. These hard, dark grey limestones, weathering reddish-brown, were quite unfossiliferous and seamed throughout with calcite. Owing to their lithological resemblance and position, I took them at once to be the westward extension along the strike of Heron's Permo-Trias series, though in this locality he had mapped the occurrence of Jurassic only. Looking east across the Dzakar Chu one could make out by colour contrast their certain continuation into the area actually mapped as Permo-Trias. Now associated with these limestones near the Lamna La I found ferruginous quartzite, conglomerate, and the ever ubiquitous shales, and it would seem that the association of these zones with the limestone would place the series on a par with Hayden's succession for the Jurassic in the Kampa and Phari regions, or at any rate with a good part of that succession. Certain beds of the succession of Lamna La seem to be missing, but there is considerable evidence of strike faulting which would explain this. While the limestone series here is so completely barren of fauna and calcitized and cannot be compared with the highly fossiliferous beds near Kampa, yet the character of the former may be entirely due to its proximity to the hard crystalline rocks and its alteration brought about by pressure against them, if not also by their igneous intrusives. At the same time it is equally possible that the same strike faulting and probable overthrusting, along the line of the Dzakar Chu and Lamna La may have cut out some of the limestone and other zones of the Lower Jurassic, and have caused the Permo-Trias limestone, continued westward beyond the Lamna La, to be thrown against the Upper Jurassic shales. On two occasions, once by a flooded river and another time by a feeble pony, I was prevented from reaching Heron's type areas of the Permo-Trias limestone and so comparing their stratigraphical relationship and character with those of the limestones I found east and west of the Lamna La.

But whether this limestone be referred to the Permo-Trias or to the Jurassic System, I noticed that it appeared to be strikingly unconformable to the banded biotite gneisses of the Metamorphic Complex on to which it transgressed. At the top of the cliff overlooking the confluence of the Dzakar Chu and the Gyachung Chu mentioned earlier, it was seen that the limestone seemed to transgress the bedded biotite gneiss, but the flooded state of the river unfortunately prevented my crossing to it and ascertaining the true nature of the junction. It is quite possible, on the other hand, considering the overfolded character of the sedimentary beds to the north that this is really the faulted junction of a thrust plane.

Conclusions regarding Stratigraphy of Mount Everest and Rongshar Regions.

Some attempt will now be made to synthesize the information gleaned from the above localities and construct a stratigraphical picture of the whole region.

For many years controversy has raged around the true origin of the

Himalayan Gneiss, the "Central Gneiss" as it was once called, as to whether it were an intrusive igneous rock, or whether it represented an extreme stage in the metamorphism of ancient sediments; whether, in other words, it were an "ortho-gneiss" or a "para-gneiss" respectively. Reference has earlier been made to General McMahon's work in proving that it, or at any rate a large part of it, represents an ortho-gneiss. Mr. R. D. Oldham has shown that it may be almost impossible to distinguish even microscopically the gneiss that was once a sediment from that truly an intrusive granite, and that field relations must be the chief factor in determination.

When I first reached the Mount Everest region I took the banded biotite gneisses, so prevalent there, as unquestionably intrusive in character. It seemed to be only one more example of the great lateral extent to which intrusive rocks can travel in sills of nearly constant thickness. It seemed possible, though, that this might have been emphasized subsequently by overthrusting and rolling out of the beds upon one another as suggested by Heron. But my investigations, brief and incomplete as they were, have brought me more and more to the view that this particular series of banded biotite gneisses represents in actuality a highly metamorphosed series of sediments probably argillaceous and arenaceous in general character. Disregarding their strikingly bedded appearance, which is mainly due to the wholesale injection of pegmatite along foliation planes, their regular position between the upper and the lower calcareous series throughout the Mount Everest and Rongshar regions, and the absence of any evidence of apophyses running off into these series, seem to indicate with a fair amount of probability that they are of sedimentary origin. The difference between this biotitic felspathic gneiss, often garnetiferous, and the augen gneiss of the deeper core of the range has already been remarked. I could find no occurrence of the latter in the Rongbuk district, nor indeed on the northern side of the main range.

As to the upper calcareous series that forms the calc gneisses and calc schists of Everest and also those of Kyebrak, they would appear to be the natural outlying extensions to the south of the so-called Permo-Trias limestone series, and their metamorphosed condition due to their being in the zone of maximum stress. If the upper calcareous series and the bedded gneissose series be definitely proved by future work in the region to be stages of a single sedimentary series, or separate ones not far removed in time, it may be possible (and their position suggests it) to link them up with Hayden's Dothak (Lilang) series of Phari, which has comparable lithological zones, though less metamorphosed.

The lower calcareous series, completely recrystallized to marbles, slates, schists, etc., that is only found beneath the bedded gneiss, would appear by its position and advanced state of alteration to be a much older series. Those exposures on the Tibetan side may conceivably be

referred to Hayden's Khongbu Series of undoubted Pre-Jurassic and probably very much older Purana age, found also near Phari; while the lithologically similar assemblages found deep down in the Rongshar may be analogous to the Mallet's Daling Series of Sikkim or the Baxa Series of Southern Bhutan. But these are only suggestions, and much further work must be done before such correlations can be safely made.

I must mention that in my reading of the structure of this region I have endeavoured to avoid the invocation of elaborate movements or even of extensive overthrusting. Overfolding and complicated dislocations without doubt there are in the area of the younger and more yielding Tibetan sediments, but on the northern borders of the main range the more compact and indurated rocks are strikingly free from much appearance of lateral thrust. I sought in vain for real evidence of an overthrust and only at the junction of the Liassic (or Permo-Trias) limestone with the banded gneisses in the Dzakar Chu, already cited, was I able to recognize such a possibility. The complicated nappes and decken movements of the Alps do not appear to have afflicted the Eastern Himalaya—at any rate as yet, and it is better, I think, to postulate rational, rather than irrational, quantities to elucidate problems on first acquaintance with a region.

But if evidence of lateral thrusting is meagre, it is not at all the case with vertical movements. On all hands throughout the small portion of the Tibetan side of the Central Himalaya I traversed, there is plain evidence of great vertical uplift. Chomolhari raises its head nearly 9000 feet abruptly from the Tibetan plain. Almost more impressive still is the great gneissose wall of Kanchenjhao and Chomoyumo in the north of Sikkim rising vertically out of the sediments of the Kampa plain. Many observers have of course seen ample signs of special elevatory forces, other than mere folding or intrusion alone, to give such prominence to this great sector of the Earth's crust, and it seems more than probable that the supremacy of Mount Everest itself, since we now know it to be in greater part of soluble calcareous rocks, must be largely due to vertical uplift in the past that may be continuing at the present time. It is not outside the bounds of possibility that the next climbing party may have a few more feet to go to reach the top!

The Kampa System and Jurassic Shales.

As mentioned earlier, I have very little to say in regard to the rocks of the Tibetan plateau, which date roughly from Jurassic to Eocene. The hurried outward and return journeys prevented more than passing observations, and these were mostly confirmatory of Heron's much more detailed work. The absence of the latter in India (I had only the opportunity of seeing him for half an hour in Edinburgh before he returned from leave last autumn) and our consequent inability to compare notes,

may detract somewhat from the value of the following short remarks on the above rocks, and modification may later be necessary.

On the return journey *viâ* Tingri I made an abortive attempt to reach the Permo-Trias area to the north and north-east of the sacred Lapche Kang Range. The pony that carried me paid far too much attention for my liking to her foal that accompanied us, and too little to the business in hand, and always tried to bite me whenever I suggested that we must be getting along; and indeed she was so far uninterested in the local geology as to once run right away, and I only caught her after a long chase by the dangling reins tripping her! In consequence I eventually only reached the neighbourhood of Kura at the south-western extremity of the vast Tingri plain. Coming from Sharto, south-south-west of Tingri; one skirted along the spur to the west that submerges itself at Shar in the alluvium of the plain. This seemed to be formed of dark sandy limestone weathering reddish, and it had a very slight northern dip. The hill against which Kura stood was of the same sandy limestone, dipping north, and forming with another outcrop across the valley, dipping south-by-west at 65°, an isoclinal anticline. No fossils could be found, but the writer knows of no arenaceous limestone of this character except within the Kampa System. Further south-west along the ridge, against this limestone anticline was faulted an anticline of dark shales with the steep limb to the north, and then followed a rusty limestone, the beds of which curved round to vertical, where they in turn were faulted against the steep limb of the shales. Subsequent folds revealed successively white calcareous sandstone, dark calcite-veined limestone, and reddish quartzite, that seemed to abut against the crystalline metamorphics without the intervention as far as could be seen of the Jurassic shales. The above sequence of folds could be roughly traced across the valley to the east in the shoulder running north to Shar, as already mentioned.

Now the hill behind Kura, as well as much of the rising ground beyond to the west, has been mapped in 1921 as alluvium, and this without doubt is a mistake. More important is the mapping of the sandy limestone at Shar as Jurassic, when it would appear, unless Heron found fossil evidence to the contrary, that this represents one of the typically similar limestones of the Kampa System. It would certainly seem that in these folded rocks at Shar and at Kura, as well as further west, we have at least some representatives of the Kampa Series. The ill representation of the Jurassic shales, if the above shale beds are in fact these at all, may be explained by the close folding and evident reverse faulting that have cut out no doubt a considerable proportion of known zones. The prevailing pressure from the north would seem here to have brought the Kampa beds right up against the Metamorphics, or otherwise regarded to have entrapped synclinally a Kampa outlier within the older folded Jurassic rocks.

Lapche Kang (Munkri) Range and Gyankar Range.

The above-described locality, south-west of Tingri Dzong, is of considerable interest on account of its being at the north-eastern extremity of the great Lapche Kang Range, which, like the similar and parallel Gyankar Range 80 miles to the east, raises its jagged crest in a direction roughly transverse that of the general trend of the Himalayan ranges. To the writer the existence and strike of these two ranges are highly significant, and they appear to have had a marked effect upon the river-systems of the country, particularly in the case of the Gyankar Range. The latter was investigated by Dr. Heron in 1921, more especially in regard to the remarkable gorges through which the Yaru Chu and Arun make their way. The Gyankar and Lapche Kang Ranges are evidently not due to a transverse system of folding but to intrusions of granitic rock along these lines. Their relation to the geological structure and drainage of the region, apart from the direction they take across the strike of the main ranges, suggests that they have undoubtedly arisen subsequent to the latter. This assumption, at any rate, would help to explain the extraordinary deflection of the Yaru Chu east of Nyönne Ri and Sangkar Ri, which possibly had its continuity with the lower Arun interrupted by the range rising faster than the river could keep open its channel across this area, the formation in consequence of a lake, and final outlet through the Rongme Gorge to the north—a similar chain of processes that I believe Mr. C. C. Fox (*Geographical Journal*, vol. 59, No. 6, p. 433) has suggested for the remarkable lower gorge at Yö Ri. Dr. Heron has mentioned that at Yö Ri the river plunges into a gorge of hard gneiss, but I should like to have the actual formation here confirmed. If, as I suppose, both these ranges mark intrusions late in the scheme of events, then it is of interest to know whether they are not of the later granitoid rocks, *i.e.* the schorl granite, or the two-mica granite of the Northern Range that Heron found in a good many localities, or even, with some slight possibility, the hornblende granite that Hayden mapped in the neighbourhood of the Tsangpo. The concentration of intrusions of the two-mica granite in the Northern Range, particularly on the prolongation northward of the two lines of ranges, rather suggests that the latter may be genetically connected with them. Heron's reference to the rock at Yö Ri being gneissose may be on account of local foliation at the time of its intrusion.

Dra and Ruli La.

Shebbeare and I, having crossed the Tse La southward to the Dzakar Chu, made great efforts on the return journey to reach Yö Ri in order to examine the problem of the latter's gorge in particular, as well as the bigger problems of the uplift of the Gyankar Range and the relation of the Permo-Trias limestones to the Metamorphic Complex in that area. The Dzakar Chu was however hopelessly flooded, and we were quite

FLUVIO-GLACIAL TERRACES IN THE ARUN VALLEY ABOVE KHAIKHUNG, WITH MOUNT EVEREST IN BACKGROUND

OLD LATERAL MORAINE SHELVES AND TERMINAL MOUNDS OF THE RONGBUK GLACIER, NEAR BASE CAMP

THE "TROUGH" OF THE EAST RONGBUK GLACIER, SHOWING VERTICAL VEIN-STRUCTURE OF ICE-WALLS AND PINNACLES

LOOKING DOWN RIGHT MARGIN OF THE "TROUGH," FROM ABOVE CAMP II.

unable to cross even as far up as Dra or make progress along the river gorge. We were obliged, therefore, to strike up into the hills from Dra in order to cross the Ruli La and so catch up our main party by forced marches to Tinki. This trek from Dra to Tsogo took us across a stretch of country apparently not previously visited, if one may judge by the variance between map and topography. Geologically this region has been mapped as Jurassic, and in greater part no doubt it is, but there is also ample evidence of Kampa System rocks squeezed in the tightly packed folds of the Jurassic. Our hurried march, however—not facilitated by a blizzard on the Ruli La at over 18,400 feet—prevented my mapping the actual extent of Kampa rocks in the neighbourhood.

Synclinal Valleys.

One of the very interesting discoveries that Dr. Heron made in the Tibetan area was the existence of rivers occupying synclines or structural basins, as opposed to the much more usual occurrence of anticlinal valleys, which structurally are so much weaker towards erosion. Though Dr. Pascoe has suggested a word of caution (*Geographical Journal*, vol. 59, No. 6, p. 436) in regard to the too hasty acceptance of these synclinal valleys, considering rather that the differential erosion resistance of the Cretaceous limestones and the other rocks may be the chief cause of these features, yet it would appear quite feasible in areas of such pronounced and abrupt overfolding, as has taken place along the line of the Phung Chu, for these to arise. I did notice, nevertheless, that near Kyishong, east of Shekar, the Phung Chu appeared most decidedly to occupy the deeply eroded axis of an anticline, both limbs of Kampa red arenaceous limestone dipping outwards into the hills on either side. And such an anticline in this particular locality would appear to be more consistent with Heron's own mapping, since just westward of this an anticlinal axis is indicated, which I was able to confirm on the ground. Also in the valley of the same river east of Tingri Gankar, in the neighbourhood of Memo, the limestones on either side seemed to dip steeply outwards, the channel occupying the broken crown of the arch, though there were in addition many minor folds in the steeply upturned limbs of the anticline. But apart from these two instances I was not able but to agree with Heron in his main contention that the Phung Chu does actually in parts of its course occupy synclinal valleys.

Basic Igneous Rocks.

The only occurrence of these I found was a pronounced dyke 6 or 7 miles south of Shekar, not far from the valley of the Phung Chu. It was a dark, much-decomposed rock that had been intruded along the strike of the very steeply dipping Jurassic shales, and these had been considerably baked in its vicinity. Later faulting had, however, pronouncedly affected the shales and the included dyke.

No rocks of this description were observed nearer or within the zone of the Metamorphic Complex.

PART II. THE GLACIERS

The Mount Everest Massif has all the characteristics of a mountain region in an advanced state of glacial erosion and corrosion, whether we attribute the greater cause to the mechanical action of glaciers or to frost action. The long " through " glaciers, whose heads and tributaries have eaten their way back into the innermost recesses of the mountains to form innumerable cirques and corries, delimited by sinuous ridges and steep arêtes, all point to a state of nearly mature glacial denudation. But though the present length of the glaciers on the northern side of the range is considerable—the Rongbuk Glacier is about 11 miles—yet it is nothing compared with their former extent. On all hands it is evident that the glaciers of this region are shrinking back into the recesses where they have their birth. And this does not appear to be seasonal variation alone, but, in common with so many other glaciated regions of the world at the present time, a secular movement in a retrograde direction.

Take, for example, the valley of the Dzakar Chu. This long U-shaped valley bears all the signs, even in its lower parts, of having been sculptured directly and indirectly by glacial action, and banks of moraine attest to its former occupation by ice. In its upper parts above the Base Camp are conspicuous three systems of moraine shelves extending along the valley sides one above the other. They are especially noticeable on the west side, though the uppermost shelf at the foot of the crags is discontinuous owing to its being broken across at places by drainage from the corries. These morainic terraces far above the level of the present lateral moraines of the Rongbuk Glacier, can be said to correspond to periods of stagnation in the gradual retreat of the once enormously vaster glacier, since the maximum ice flood of the Glacial Cycle. That the Rongbuk Glacier has halted at times in its retreat is also borne out in an interesting way by the large mounds of terminal moraine that it has dumped at intervals in the bed of the valley, the greater segregations being separated by areas relatively clear and level. Our Base Camp was situated on one such collection of mounds, and for nearly $\frac{3}{4}$ mile ahead of this was an even plain, levelled no doubt to some extent by the outwash from the glacier, right up to the present moraine-covered snout. Other evidence of progressive retreat is to be found at the termination of the East Rongbuk Glacier, which has shrunk back nearly a mile from its former confluence with the main Rongbuk Glacier.

Evidence of three separate periods of glacial extension has been discovered by Oldham in Kashmir, and similar oscillations have been observed by Huntingdon in the Pangong valley of Ladak, but it would be altogether premature at this juncture to suggest correlation between these and the movements of the Mount Everest glaciers so far to the east.

Conditions at the North Col.

In the mind of the writer a particular and somewhat peculiar local case of this wholesale waning of glaciation is to be seen at the North Col, between the peak of Mount Everest and Changtse. Here is a col at 23,000 feet piled up in the most impressive and weirdest way with gigantic blocks of ice, their sides clean cut for the most part, seeming to be the disrupted fragments of a much greater mass of ice that once capped the col. The eastern slopes of the col, up which lay our regular route, consisted of hard névé at an average angle of about 35°, broken at intervals by schrunds and ice facets. The western face towards the West Rongbuk Glacier is mostly of steep ice-slopes. Now, in this high country with such evident signs on all sides of slight precipitation, and probably increasingly so, it is extremely difficult to see how the present snowfall is sufficient to give this enormous accumulation of ice on the eastern side and maintain it constant in such vast amount and in such a position. And if it were so, it seems incompatible indeed with the occurrence of the great disrupted blocks of well-consolidated névé on the top of the col, which under normal conditions of annual precipitation would be speedily submerged and formed into a regular and continuous cornice. Col. Norton, on the other hand, considers that the present snowfall, concentrated on convergent lines into the funnel that the North Col forms, is probably sufficient to explain the amount of the ice present, though he admits the difficulty in this view of explaining the well-consolidated cut-up blocks at the top. In my opinion this great ice mass in all probability represents the lingering remains of a once greater amount that may have been more uninterruptedly continuous with the East Rongbuk Glacier when the latter at an earlier period filled its basin to a higher level: in other words, it may be described as a relic of the past—a mass of "fossil névé."

Motion of the Glaciers.

The northern side of the Great Himalaya is a region that exists in, and is subjected to, a set of physical conditions unique probably in the world, and the effects of these conditions on its glaciers are correspondingly great. Low mean annual temperature, extreme dryness, great altitude, together with a tropical sun, must be expected to produce marked results, quite different from other effects in glaciated regions of more temperate climate and of other latitudes. In many of the phenomena I was reminded of the Arctic, the glaciers of Spitsbergen in certain respects exhibiting comparable features. Owing to low mean temperature the ice of these Mount Everest glaciers must be proportionately low in temperature, and this will mean that it has a correspondingly higher degree of rigidity or viscosity, whatever may be our views as to the ultimate structure of glacier ice in general and its mode of flow. Mostly the ice is of a very coarse texture, the granules being on the whole about the size of walnuts, a

condition in which they simulate Arctic glaciers more than they do Alpine. On account of the rigidity of the ice the motion of the glaciers will be slow. Somervell and I endeavoured to estimate the rate of flow of the East Rongbuk Glacier by the motion of one of the pinnacles well out in the ice-stream. In ten days we found it had moved only about 2·5 feet, equivalent to 3 inches per day. Such observations as have been made on the motion of Himalayan Glaciers on the southern side and at the north-western end of the range, have given a diurnal motion of 3 to 5 inches at the side, and 8 to 12 inches in the middle.* Though our observation was an isolated one in the lower part of the glacier and but roughly undertaken, it seems to indicate a relatively slow rate of movement for these glaciers, such as would be expected. But though the velocity be low it must not be supposed that the erosion of their beds by the glaciers will be correspondingly less, for the extra rigidity of the ice will hold stones in the base of the glaciers with increased firmness and abrade the bottom with greater force. The gigantic moraines of these Mount Everest glaciers are evidence enough of the destruction wrought mechanically by the motion of the glaciers, apart from that brought about by the agency of frost action.

Length and Minimum Altitude of Glaciers.

The present lengths of the glaciers of the Mount Everest region compare fairly favourably with those of other parts of the Himalaya, and are only notably exceeded by the immense "longitudinal" ice-streams of the Karakorum. The Rongbuk Glacier system has a greatest length of about 12 miles, and the snout is at an altitude of nearly 16,500 feet; while the Kyebrak Glacier is nearly 11 miles in length and descends to about 15,400 feet. These are the two principal mapped glaciers on the northern side of the main axis, and typify the "transverse" glacier, that is one flowing down a valley at right angles to the range. Elsewhere in the Himalaya the latter never attain the size of the longitudinal type, which occupy troughs between the ranges. The only mapped representative of the longitudinal variety is the Kangshung Glacier on the northern side of the Makalu Group, which has an approximate length of 12 miles, and whose snout is at 14,600 feet above sea-level. As an eastward-flowing glacier it is comparable to the Zemu Glacier of the Kangchenjunga Group, which however has a length of 16 miles and descends to 13,900 feet. That none of these figures for the minimum altitude reached by the glaciers is as low as those of the north-western end of the range is probably chiefly on account of the lower latitude, though other factors of local situation, supply, and gradient must always be taken into account. The glaciers of Kumaon and Lahoul have a lower limit of 12,000 feet, while those of Kashmir descend to about 8000 feet in some cases.†

* D. N. Wadia, 'The Geology of India,' p. 15.

† *Ibid.*, p. 14.

Wastage Effects.

In spite of the low mean annual temperature from which this region suffers, its situation in such a low latitude (28° N.) causes it to experience the effects of a very hot sun. On the North Col at 23,000 feet on more than one occasion when I took temperatures at midday, the air temperature was 29° F. whilst the sun temperature at the same time was 105°. In such a degree of heat with a high-pitched sun melting effects on the glaciers and snowfields are immense, though actually the visible melting is surprisingly little, the high evaporation under such low atmospheric pressure causing the solid forms of water to pass direct into vapour without the intermediate liquid state. High up on the face of Mount Everest this is strikingly the case, and a considerable snowfall will in spring and summer have evaporated into thin air in a few hours without any visible melting. Consequently, and fortunately, "verglas" does not exist. On the glaciers the same condition holds in less degree, and it is only in their lower parts that streams of any size develop, and then not in our experience till the end of May. The intense ablation of the glacier surface gives rise, amongst other things, under these conditions to the remarkable ice pinnacles to be shortly described. And in spite of this ablation, and in contrast to the dirt-strewn glaciers of the north-western end of the Himalaya, these in the east and on the north side of the range are relatively clean. The Kangshung Glacier, however, on the southern side of the main axis shows in the photographs taken in 1921 a decidedly dirty surface due to mud or moraine. This may be owing to the even greater ablation that goes on on the warmer southern side; at the time these photographs were taken the monsoon was actually in progress.

On the other hand, it might be suggested that this effect is partly due to the deposition of dust borne on the prevailing winds from the plains of India, as has been claimed for the dirty state of the ice of the north-western glaciers, but since the prevailing winds at Mount Everest appear to be westerly this can hardly be maintained. In Spitsbergen, after a period of great ablation and thaw I have seen the glaciers appear quite black, and in that remote region dust deposition cannot obtain; on examination the incorporated dirt has proved to be highly comminuted mud derived from the rocks over which, or between which, the glaciers pass, which is concentrated by the action of thaw and ablation. The state of the Kangshung Glacier is, nevertheless, most probably brought about by the greater temperature variation of this south side, increased frost action, and consequent extra rock-waste from the surrounding cliffs, and from the south-east face of Mount Everest in particular, where the inward dip of the beds lays them open to special attack.

On the East Rongbuk Glacier were some rather beautiful examples of the so-called "cryoconite holes" or "dust wells," in which small particles of morainic material had melted their way down into the surface

of the ice, as is so often to be seen on Arctic glaciers especially. Here, with the high altitude sun, the small stones and particles had melted their way very deeply down, and the wells becoming filled with water during a warm period it had later crystallized in a radial manner, and given the effect of round flower-like forms of clear ice within the surface of the glacier. The typical honeycombed ice of the Arctic was however not noted to any extent.

A striking example of the effects of a tropical sun is the way in which eastward and westward flowing glaciers frequently have their southern sides melted back into steep ice-cliffs, a case in point being the tributary to the East Rongbuk at Camp II., though others on the eastern flank of the latter were equally affected: this action is aided by re-radiation of heat from rock-walls enclosing the glacier.

An important factor in promoting ablation is the high wind, and we had no better example of its force than near the Base Camp. Here reinforced by sand, and impinging on blocks of granite, situated in gaps between moraine heaps, it was sufficient, blowing through these funnel-like gaps, to have grooved the blocks on their windward southern faces to a depth of an inch or more—long incisions across them independent of their mineral character and cutting across crystals of felspar and tourmaline alike. The sand-blast had been sufficiently intensive to have done its work since these morainic blocks were dropped by the glacier, now not much more than half a mile away.

A melting effect, which unfortunately I never had the opportunity to examine close at hand, is the conspicuous flutings on many of the peaks, particularly on their northern faces. The Lingtren Group of peaks at the junction of the main Rongbuk and West Rongbuk Glaciers are notable examples of this. Many travellers have no doubt considered such flutings elsewhere to be merely the result of a scoring and gouging of the face by falling cornices and avalanches, and the writer must admit that he had formerly rather subscribed to this view. But it is evident in numerous instances that the sharp ridges and arêtes above these fluted faces do not, nor ever have, supported sufficient snow or ice to gouge out by their fall such deep incisions. I could only conclude, from rather distant observation, that the flutings and ribs, which often extend in pronounced degree right up to the crests which support them, must be caused by a differential melting effect of the rays of the hot sun inclined obliquely to the face on which they act; though here again melting and consequent fluxion in the ordinary sense, owing to the high altitude and quick evaporation, is non-existent. I am not aware that the phenomenon is known, at any rate in such pronounced form, outside the Himalayan range, though it may possibly be seen in other high ranges of the tropics.

The Trough.

This interesting and possibly unique feature that provided a natural causeway for nearly 2 miles of the way up and down the East Rongbuk Glacier between Camps II. and III., will ever be remembered as a fairy scene, of the greatest beauty, by those privileged to use it as a highway to the precincts of the throne of the Great Goddess—Chomolungma. Imagine a corridor up to 50 feet deep and 100 feet wide with steep sides buttressed and pillared with fretted ice of exquisite tints of blue and white and green, and paved at intervals with the ice-covering of charming glacial lakelets, out of the surface of which were growing here and there clusters of ice-pinnacles, themselves sculptured into an infinity of forms. It was through scenery of this description that our way lay—exhilarating in the extreme, except at the hot hours of the day in late May and June, when the close stagnant air within the depression of the Trough was apt to produce a certain lassitude and disregard for its remarkable beauty!

The Trough, as a depression running longitudinally down the East Rongbuk Glacier, may be said to commence somewhere about the 20,000-foot contour of Major Wheeler's 1-inch map, and it continues uninterruptedly as far as the moraine-strewn lower end of the glacier. On first acquaintance I was at a loss to account for this remarkable feature. In early May the winter snow was still forming a practically continuous covering over the upper half of the East Rongbuk Glacier, and it was in consequence impossible to make any examination of the nature of the ice in the neighbourhood of the first pronounced depression. I noticed, however, that the snow seemed to be concealing a notable amount of ridging of the ice near the commencement of the Trough proper. It was not till later, when the new snow had evaporated sufficiently to reveal the underlying ice, that it was apparent that the latter exhibited plain evidence of severe stress. Here on the prolongation of the line of the Trough was a beautiful development of Forbes' "Ribbon or Vein Structure"—clear blue bands of ice alternating with granular and more opaque air-filled varieties, the whole running parallel with the direction of motion of the glacier. It will be remembered that Forbes, who first described this "ribbon structure" during his classical researches on Alpine glaciers, showed it clearly to be a structure set up in ice in consequence of great compression and shear; in fact, it is precisely comparable to the foliation of rocks under like conditions of stress. Without following Forbes *in extenso* in his ideas of the true plastic character of ice and the consequent viscous flow of glaciers, developed partly around his discovery of the "ribbon structure," the writer has from his own observations in the Alps, Spitsbergen, and the Himalayas seen sufficient evidence to satisfy him that this banded "ribbon structure" in ice, usually seen vertically disposed, though by no means always so, is definitely and chiefly brought about by intense compression, such as at the junction of two convergent ice-streams, and is not to be confused, as some glacialists

have done, with the bedded structure of glacier ice due to seasonal ablation and deposition, or concentration of silt in layers within the ice.

That the ice above the Trough was undergoing severe stress was apparent not only from its foliation, but also from the faults—" flaws " or " tear-faults "—that had been extensively developed in this area, indicating that the ice was endeavouring to adjust itself to exterior forces; and where dislocation did not bring relief a ridging up of the ice was prevalent, as referred to above. At the commencement of the Trough itself the foliation bands seemed to have reached their greatest development, actual fusion of the ice taking place from the heat engendered by the compression, accompanied by simultaneous evaporation of the fused ice. And on this line of fused ice the depression of the Trough seemed to have developed, its walls displaying the banded structure in decided, though less pronounced, degree, and standing somewhat in relief above the general surface, on account, no doubt, of adjustment to stress.

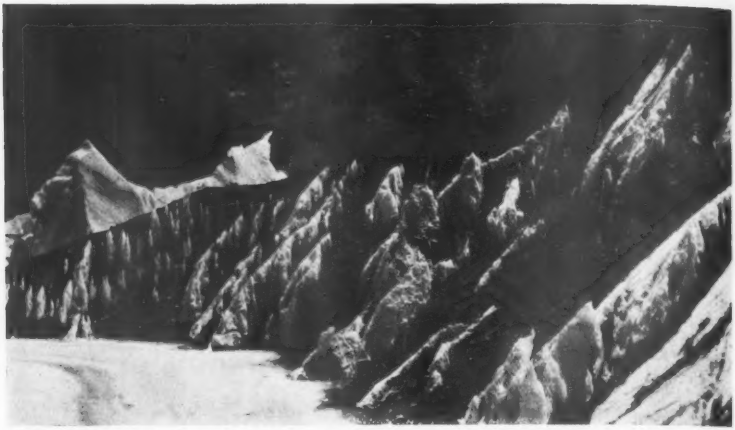
Now the distance of the line of the Trough from the true left side of the glacier is about 400 yards, and coincident with it seems to be the medial moraine from the north-east shoulder of Mount Everest, carried englacially, for patches of moraine appear at intervals in the bed of the upper part of the Trough. Below the 19,750-foot contour it converges with the moraine coming from the north spur of Pt. 22,090, and this material largely carpets the continuation of the depression down the left centre of the lower glacier. The weathered walls of this lower part showed marked traces of the longitudinal banding due to their earlier foliation.

The Trough seems to be a line of special stress between the two ice-streams, the one made up of the tributaries from the North Col and eastern slopes of Pt. 22,090 of Changtse, and the other the main mass of the glacier to the east, and its formation would appear to be due to the compression of the smaller western ice streams by this main eastern mass, especially in the narrow constriction between Pt. 22,090 and the opposite side (western spur of Khartaphu), through which the whole of the glacier must pass. A glance at the map will show clearly the bottle-neck character of this outlet and how at the critical point an extra tributary from the western slopes of Khartaphu adds its quota of ice to the already constricted mass. And it is just here that the conditions of stress above referred to are met with, and the Trough develops. The constriction appears to set up forces of compression and shear that along the line of englacial moraine from the north-east shoulder reaches its maximum, the upper layers of ice being fused and the lower layers only retaining their necessary viscosity or rigidity on account of their solid morainic content.

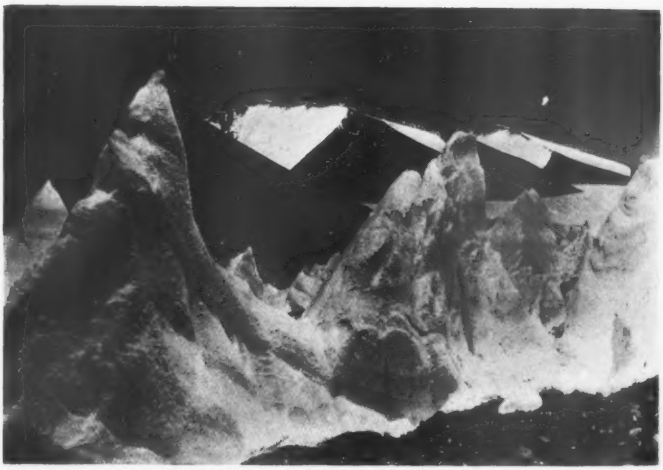
It may be objected that if, as postulated above, the ice is definitely fusing under compression, it should appear in the liquid state along the line of greatest stress, and perhaps even be present as a stream of water

INCIPIENT ICE PINNACLES FORMED FROM THE WALLS OF THE "TROUGH"

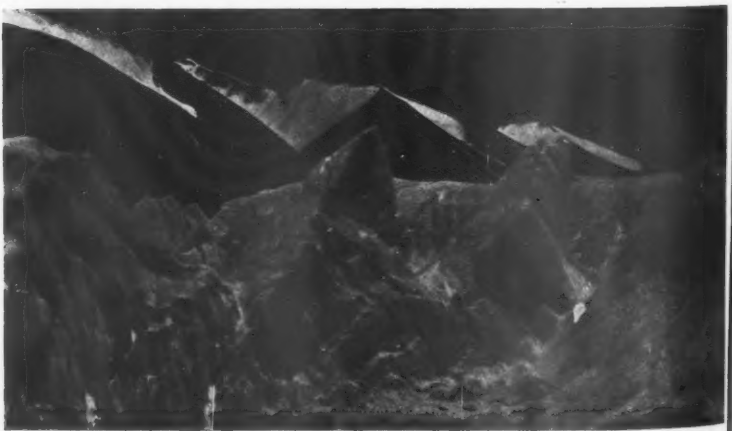
END OF TRIBUTARY TO EAST RONGBUK GLACIER NEAR CAMP II., SHOWING SEASONAL BEDDING SPLIT INTO PINNACLES BY MOVEMENT AND MELTING



"NIEVES PENITENTES" FORMED FROM AN ICE-CLIFF, EAST RONGBUK GLACIER



PINNACLES OF THE "TROUGH"



PINNACLES OF "TROUGH," SHOWING STEEPEST SIDES TO THE SOUTH

flowing down the Trough. Actually the latter showed no signs of earlier or later water erosion, nor was there present in it a stream of water until late May, and then only in its lower part after its junction with the moraine from Pt. 22,090 above referred to. On theoretical grounds, even if partial melting took place with the development of interstitial or interfoliate water along the line of greatest compression, such water as was liberated at the surface would tend to be quickly evaporated under the prevailing conditions of aridity and low pressure. Whilst in the light of Mr. C. S. Wright's researches on Antarctic ice and his conception of ice structure on the line of the quantum theory (to use his own words, *Geogr. Journ.*, March 1925, p. 212), "the development of heat by pressure should not bring about melting, but the resulting energy cause an increase in the number of mobile ('vapour') molecules which merely have a tendency to diffuse to points (within each individual crystal) less favoured in this respect." And it must be noted that "this diffusion does not require a free surface for its operation." In this view, presumably, the line of the Trough, owing to the operation of exceptional outside forces, should have an increased mobility; and it may be this which helps to produce a drag and cause the system of faultings above its commencement, already referred to.

The Trough therefore, in my opinion, would appear to be a permanent feature of the East Rongbuk Glacier; permanent, that is to say, under the present conditions of glaciation. That the explanation given above is probably not the whole story of its origin I am quite prepared to admit, for though my conclusions as to its formation were formed on the spot, they were made somewhat hurriedly in the little time available. And, moreover, it was more and more impressed upon one during one's short stay that the unique glacial conditions of this region are deserving of years of special study to understand all fully.

Ice-Pinnacles.

Connected with the phenomenon of the Trough was the perhaps even more striking one of the gigantic ice-pinnacles, that have lent themselves so well to photography. They had their best and largest development in the lower part of the Trough, though their birth was traceable to the walls of the upper portion. As these walls became weathered and melted back differentially during the bodily progress of the Trough down the glacier, buttresses and spurs make their appearance, and tend eventually, in proportion as the processes of ablation and thaw increase in the lower reaches of the glacier, to become detached and stand in isolated masses. And an important factor, which promotes undoubtedly their tapering and spired form, is that of the high-altitude sun of these latitudes, which during the middle hours of the summer day can shine down on them from a position within comparatively few degrees of the zenith and so produce a nearly equal melting effect on every side. The slight inclination of the

sun to the southward does however, produce a marked steepness on all their southern sides.

In a similar way in different parts of the glaciers was to be seen the incipience of pinnacles from smaller ice cliffs than those of the Trough, the process being frequently started by morainic material (like small glacier tables) protecting the ice column beneath them from the steep rays of the sun, and when the protecting cap fell off, the pinnacle assuming a sharp conical or pyramidal form. A similar genetic process can be ascribed to the pinnacles of the main Rongbuk Glacier and others, the principal necessary conditions being a preliminary splitting of the glacier surface into cliffs of whatever size and steep solar rays to act upon them. The phenomenon of "nieves penitentes," first described from the Andes, is undoubtedly equivalent in its genesis to that of these enormously larger pinnacles, conditions of latitude, etc., being similar; in fact, typical examples of normal nieves penitentes were to be seen on the Mount Everest glaciers.

Earth Pillars.

Fine examples of these were to be seen on the steep slopes of old moraine above the end of the main Rongbuk Glacier. Some of them were 20 feet or more in height, although the capping stones, essential especially to the earlier stages of their growth, were in most cases missing. Their continuance in spite of this loss is only another indication of the diminished precipitation of the region.

Polygonal Surface Markings.

I was particularly interested to come across examples of these frost-jointing forms, since they are confined almost entirely to the circumpolar regions. I cannot here go into the question of the mechanism of their formation; suffice it to say that Mr. J. S. Huxley and the writer, from investigations in Spitsbergen, have already described the rôle of frost action as being the primary genetic process (*Geogr. Journ.*, March 1924). A climate that is fairly dry and has for a portion of the year at least a temperature alternating repeatedly on either side of the freezing-point, is productive of the best results. Hence the rare occurrence of the phenomenon in low latitudes, unless other factors such as altitude come in.

The present examples were seen at an altitude of about 17,000 feet on an old upper moraine terrace of the main Rongbuk Glacier on its eastern side. They were mostly stone polygons about 4 feet across, with a network of secondary fissure polygons within the former. The stone borders were composed chiefly of slatey material, as is so frequently the case in the Arctic, and on excavation these were found to be quite superficial, extending down only 2 or 3 inches into the mud. No "tjaele," or frozen soil, could be found beneath. In order to get some indication of the forces acting, and if possible to confirm our earlier views as to these, I displaced some of the stones from the borders, but in

the short interval of observation—about a month—no movement was discernible, though much drying out of the ground had taken place. Besides these compound " stone-fissure polygons," there were to be seen systems of the simple fissure-polygons, quite small in size, and with appearances of relatively recent formation, giving the impression in this case of desiccation rather than repeated frost action.

Former Extent of Regional Glaciation.

With such clear evidence in the Mount Everest region of a once greater extent of the glaciers, let us endeavour now to form a picture of the state of affairs when the maximum phase of the Glacial Cycle was operative. Reference has been made to the former much greater bulk of the Rongbuk Glacier. But I think without doubt the most amazing cases we saw of the once enormously greater expansion of these Tibetan glaciers was west of the Lamna La, where huge moraines bordered the valleys debouching from the south on to the plains. And perhaps the wide valley, in whose upper reaches lies the Kyebrak Glacier, was most impressive of all in this respect. Here immense morainic ramparts towered nearly 200 feet on either side above the wide alluvial valley, and extended to the Tingri plain, a distance of 15 miles or more from the present snout of the Kyebrak Glacier. Hence in all probability the present site of Tingri was once engulfed by ice. Now throughout our march from Sikkim by way of the valleys of the Chiblung Chu and Phung Chu was plain evidence in the systems of terraces along the hillsides of former extensive flooding of these valleys. In as far as I was able to investigate, these terraces in scarcely any cases indicated fluviatile action alone, and there can be no doubt that such accumulations of material as are to be found on the Lingga Plain, and in particular the typical boulder clay in the gap west of Kyishong, represent fluvio-glacial, if not direct glacial, deposits. In the hilly tract of country around the Ruli La, and particularly in a valley north of Dra, were to be seen terraces and cliffs of boulder clay, in places tunnelled out in a curious manner and presumably connoting the work of glacial streams during the local wane of the ice.

It is unnecessary to multiply these illustrations. Nevertheless, I must refer to the case of a peculiar find on the Phusi La at the head of the Rongshar Valley. Here Beetham brought to me a rounded clay pebble, split on one side and exposing the whorls of an ammonite cast: a specimen of indubitable Jurassic origin. As already mentioned, the rocks found *in situ* in this district are entirely of the pre-Jurassic Metamorphic Series, and there are but three possible explanations of the occurrence of this Jurassic specimen on the Phusi La. Either it represents an ice-borne erratic that has been carried something like 20 miles from the nearest Jurassic outcrops to the north and dropped on this pass of 17,000 feet under conditions which must imply an ice flood sufficient to overflow the lowest cols of the present divide of the main range and

reverse the northward flow of many existing glaciers; or it was carried to the top of the pass and deposited there by some wily Tibetan in order to involve the inevitable foreign traveller in scientific difficulties and wranglings; or alternatively it was dropped accidentally (we must hope so in view of the last statement!) by Dr. Heron, when he crossed this same pass in 1921 with Col. Howard Bury, on the assumption that an unfortunate hole in his pocket let slip such a specimen that must have been collected many miles away in the Jurassic zone! Personally, I incline towards the first alternative, though the difficulties resulting in its adoption are very considerable. I could find no unequivocal evidence of other erratic material on the Phusi La, and the rounded character of the surface features may have been caused by sub-aerial action other than glacial.

Now if we consider, in the light of such morainic evidence as remains, what the effect on the country of the maximum phase of the Glacial Cycle must have meant, we must conclude that the ice completely blocked most of the valleys, and in fact that in many instances the ice-streams were linked up on this north side of the main chain. Whether during the maximum stage the ice-floods were ever sufficient to form a more or less continuous sheet, of the nature of what in the Arctic has been called "Highland Ice," is questionable; more morainic or other evidence must be found, apart from the solitary Phusi La specimen, before such a thesis can be confidently maintained. But if such were the case, the range lying to the north and forming the southern boundary of the Tsangpo watershed would have at any rate its passes overrun by the ice; and under similar conditions one can only assume that considerable portions of the Tibetan Plateau to the north would be in like manner engulfed.

It is difficult to resist this inference when one considers such a highly elevated tract as Southern Tibet subjected to the frigid conditions known to have obtained elsewhere. At the same time the question must be borne in mind whether during the European Glacial Epoch the then precipitation was sufficient to accumulate the amount of ice suggested above—at any rate, in the plains of Central and Southern Tibet. Dr. Hedin has assured me that he found no certain evidence from glacial deposits of an ice-sheet as far south as the Trans-Himalayan Ranges. But for all that one must conceive of a great accumulation of ice in between the latter and the Great Himalayan Range, during the Glacial Epoch, for there is no reason to suppose that the general trend of monsoonic precipitation was much different then than now; and if, as the stratigraphical and structural evidence earlier cited rather suggests, the Great Range has become progressively elevated since Pleistocene times, due, possibly, to relief of its ice-load or some other isostatic adjustment, its once less formidable barrier may have allowed of even greater precipitation on the northern side than at the present time.

EARTH PILLARS ON OLD MORAINE OF RONGBUK GLACIER

SAND-BLASTED GRANITE IN WIND-GAP NEAR BASE CAMP

STONE-POLYGONS WITH SECONDARY FISSURE-POLYGONS WITHIN THEM: OLD MORAINE TERRACE OF RONGBUK GLACIER

CRESCENTIC SAND-DUNE IN PLAIN AT IUNCTION OF CHIBLUNG CHU WITH PHUNG CHU

LOOKING DOWN JUNCTION PLANE OF UPPER CALCAREOUS SERIES (LIGHT) AND BIOTITE GNEISS (DARK) FROM 28,000 FEET ON MOUNT EVEREST

But whether regionally this were the case or not, the local maximum ice-mass in the Tingri and Kyebrak districts would have to be sufficient not merely to raise the present surface of the Kyebrak Glacier by over 1000 feet—an inconsiderable amount taking into account the subsequent erosion of its bed—but by such an amount more as would give a trend to the mass southward over the Phusi La and other passes, in order to carry the Jurassic specimen, and any other similar material, to its position on the former from the nearest parent outcrops to the north. Such an ice mass surging over the lower cols of the Great Range, would send its glaciers far down on the southern side of it, much below the limits reached by the present representatives.

Although I could find no unmistakable evidence in the Rongshar of the presence of a glacier below 14,000 feet, I feel decidedly that more extensive search than I was able to make, pent up as one was in what is most probably a profoundly "overdeepened" gorge, would reveal at least as low moraines as those found by Prof. Garwood in the Lachen Valley of Sikkim at 8790 feet: certainly at Trintang (12,000 feet) in the Rongshar could be seen a shelf on the valley side very suggestive of earlier glacier formation. And in regard to the suggestion that the Tibetan Plateau may at one time have had such an accumulation of ice that it overflowed the present waterparting, Dr. Blanford long ago showed that there was distinct evidence of such having occurred at the head of the Lachen Valley, a dictum in which Prof. Garwood was inclined to concur ('Round Kangchenjunga,' p. 299). Although without further extensive work it may perhaps be premature to suppose, as the writer has sometimes ventured, that the great transverse gorges of the Himalayan axis may have been largely due to the work of glaciers descending from a Tibetan ice-cap, or from a Highland ice mass as postulated above, yet we may consider that when the upper Arun basin was occupied with the ice it must have held during the Glacial Epoch, this mass and its concomitant moraines must have had a considerable effect, especially during its wane, upon the natural trend of the drainage, and very conceivably been the determining factor in the astounding course taken by the River Arun at Yö (Ri) and in its upper reaches of the Yaru Chu. All these fascinating problems can only be solved if and when political restrictions cease, and further work can be done amongst the innermost recesses of this important and little-known portion of the Great Himalayan Chain.

The map published with this paper is based upon Major Wheeler's survey of the immediate environs of Mt. Everest, with the geological formations roughly indicated. The other districts mentioned in the paper can be found on Dr. Heron's map (*G.J.*, June 1922) and the significance of the observations followed therefrom to some extent.

Before the paper the PRESIDENT said: This afternoon we are to have the result of Mr. Odell's observations upon the physiography of Mount Everest

made in the course of the last Mount Everest Expedition. I have not had the advantage of discussing with Mr. Odell the chief points of his paper, and I do not know, therefore, what particular points he is to deal with, but I understand that amongst the surface features of Mount Everest there are two which certainly require explanation in that one would not expect them to be there at all. The first is the immense mass of ice on the North Col with nothing, apparently, to feed it; and the other is the trough in the East Rongbuk Glacier. I will ask Mr. Odell to tell us what he has to say on the subject.

Mr. Odell then read the paper printed above, and a discussion followed.

Mr. R. D. OLDHAM: I do not think I have anything to say, except that I have listened to the lecturer's paper with very great interest, and considerable admiration for the amount of work he was able to do, in very difficult circumstances. From personal experience of what working at high altitudes means, I can fully appreciate these difficulties, although my own limit never exceeded 20,000 feet.

Mr. A. F. R. WOLLASTON: I am not really competent to make any comments on Mr. Odell's paper, but I cannot agree with him with regard to his explanation of the mass of ice on the top of the North Col. I think that the amount of precipitation during the monsoon period is quite sufficient to account for it. If it were a decaying relic of a very large former mass of ice, I think it would take up another form; it would probably be flattening out. However, that is a matter of opinion. Moreover, I am not convinced by Mr. Odell's account of the causation of the trough in the East Rongbuk Glacier. It seems to me that a great deal more evidence is required before his explanation can be accepted as sufficient.

Mr. F. G. BINNEY: I am afraid it is rather a red herring to compare the trough in the Rongbuk Glacier with the so-called "ice-canals" which we found in North-East Land last summer. We were sledging on an ice-cap, not more than 2000 feet high, in a region where the ice was disturbed by no nunataks, while Odell made his observations on a normal glacier. But as these appear to be two unique glacial phenomena, I shall briefly describe the main points of the "canals," though I can offer no explanation for their existence.

We were sledging from the east coast to the west coast, and approximately in the centre of the island we traversed a region pitted with long lines of "canals" (or channels) in the ice. These channels ran from north to south, as far as the eye could see. They ranged in breadth between 30 feet and 100 feet. In most places they were bridged over or chocked up with hard congealed snow, which was concave and sagged below either lip of the channel. Invariably we found small crevasses on either side of the central mass of snow, not more than 3 feet across and usually bridged with soft snow.

In some places the whole channel was exposed, there being no snow bridge or chock. We looked down into a chasm some 40 feet deep. Its base was a mass of congealed snow in a chaotic condition. Nordenskiold describes how during his journey the party camped in these channels. It would have been quite impossible to pitch a tent on any of the open parts of the channels which we observed. We were two days in this region, in thick fog and snow.

The PRESIDENT: It only remains for me to express to Mr. Odell the gratitude of this audience for the trouble which he has taken in putting before us the results of his observations. He has given possible explanations of the mass of ice on the North Col, and also the trough in the East Rongbuk Glacier. I was a little disappointed that he was unable to offer any explanation of

those amazing sheets of fluted snow which are such an outstanding feature of the mountains in that part of the world. I have often gazed upon these vast walls of fluted snow with feelings of astonished admiration, and I had always understood that the most likely explanation was the falling of matter from higher ground, but I understand that Mr. Odell says that that is not a possible explanation, though he is unable to offer any explanation in its place.

Mr. N. E. ODELL: I think in the majority of instances there does not seem to be sufficient evidence of, say, a cornice above to give the effect of a scouring of the face in that way by avalanches. The flutings seemed to be present where such conditions were non-existent.

The PRESIDENT: At any rate, Mr. Odell has given us an enormous amount of information this afternoon, and a great deal of material which will certainly be of profound interest to geologists. I should like to express to him our deep gratitude for the trouble which he has taken, and the thanks of this audience I accord to him on your behalf.

RACIAL MIGRATIONS IN THE BALKANS DURING THE YEARS 1912–1924

A. A. Pallis

DURING the last twelve years the Balkan Peninsula and in particular the provinces which changed hands as the result of the Balkan Wars of 1912–1913 and the Great War of 1914–1918, namely, Macedonia and Thrace, have witnessed mass-movements of whole populations on a scale which can hardly be paralleled, unless we go back to the period of great racial migrations which coincided with the break-up of the Roman Empire.

These mass-movements were, partly, the result of direct warlike operations, such as the flight of the Moslem population of Eastern Thrace during the advance of the Bulgarian army up to the lines of Chataldja in October 1912, the flight of the Bulgarian population of Central Macedonia before the advancing Greek army in June 1913, and the flight of the Greek population of Western Asia Minor and Eastern Thrace following on the Turkish victory in Anatolia in August 1922; partly the result of political reprisals and persecutions, such as the expulsion of the Greek population of Western Thrace in 1913, the expulsion of the Greeks of the Thracian and the Anatolian littoral by the Young Turkish Government in 1914, and the wholesale deportations of the Greeks and Armenians of Eastern Thrace, the Marmara, and Pontus to the interior of Anatolia in 1915–1916; partly the consequence of voluntary emigration following on the transfer of territories, such as the emigration of the Greeks of Monastir, Gevgeli, and Strumitsa and of the Moslems of the Macedonian districts ceded to the Balkan Allies in 1913–1914; partly the result of formal agreements for the exchange of populations between

former belligerents, such as the Turco-Bulgarian Agreement for the exchange of the Moslem and Bulgarian populations on the Thracian frontier, the Greco-Bulgarian Convention of 1919 for the voluntary emigration of the Greek and Bulgarian minorities in both countries, and the Greco-Turkish Convention of 1923 for the compulsory exchange of the Moslem and Greek-Orthodox minorities.

It is obvious that all these movements which involved the transfers, in either direction, of between 2,300,000 and 2,500,000 Greeks, Bulgarians, and Turks—leaving out of account the Armenians—have had the effect of profoundly modifying the racial geography of the regions in question. There has been a complete re-shuffling of races in Macedonia, Thrace, and Anatolia. Where before there was great diversity, there is now nearly complete homogeneity. Political problems, which owed their complication to the mixture of mutually antipathetic races, have been simplified.

Thus the Macedonian Question, where the inextricable mixture of Greeks, Bulgars, Turks, and others had been the cause, up to 1913, of chronic racial warfare to such an extent that the word "Macedoine" has found a permanent place in our culinary vocabulary as an appropriate name for "fruit-salad," has practically been solved by the disappearance of its causes. As a result of the re-sifting of populations which has taken place during the last twelve years, Macedonia north of the Belatista has become purely Bulgarian, Southern and Western Macedonia (with the exception of some small and dwindling enclaves), predominantly Greek, and Thrace east of the Maritsa completely Turkish.

With the termination of the exchange of populations between Greece and Turkey on the one hand, and Greece and Bulgaria on the other, the period of migrations is now practically closed—at any rate as far as the territories annexed to Greece, Bulgaria, and Turkey are concerned *—and it is possible to take stock of the situation and judge of the general result.

The writer has been in an exceptional position to follow these movements since they began. As Relief Officer in Macedonia in 1913, as Secretary-General of the Refugees' Settlement Commission in Hellenic Macedonia in 1914–1915, as Deputy Governor-General of Salonika in 1917–1918, as Hellenic Commissioner for the re-settlement of Eastern Thrace and the Marmara littoral in 1919–1920, and as Hellenic Delegate on the Commission for the Exchange of populations between Greece and Turkey in 1923–1924, he has been personally associated with the transport and settlement of most of the populations concerned, and has had access to all the official records and statistics.

* The emigration of the Moslems of Serbian Macedonia which had already begun in 1914, is very likely to be resumed in the near future, as it is the avowed policy of the present Turkish Governments to attract this population to Anatolia, as soon as the Moslems from Greece have been properly settled.

Macedonia.*

From the outbreak of the Balkan War in October 1912 up to the end of 1924, Macedonia has witnessed no less than seventeen migratory movements in either direction. There has been one constant flow of populations between the various territories of the Southern Balkans, and from one side of the Ægean to another.

In the term "migratory movements" are to be included all mass-movements due to any cause whatsoever, whether the result of forcible eviction (war-like operations, deportations, etc.), voluntary emigration, or treaties and exchange of populations.

These migrations are set forth below in their chronological order.

(1) 1912. The advance of the armies of the Balkan Allies—the Greeks on Salonika, the Serbs on Uskub and Monastir, the Bulgars on Kavalla and Salonika, resulted in a partial stampede of the Moslem population of the invaded area towards Salonika. Of the Moslem population of Greek Macedonia, some 10,000 went over to Turkey as the result of this panic.

(2) 1913. On the outbreak of the second Balkan War between Bulgaria and her former Allies, a very considerable portion of the Bulgarian population in the districts to the north of Salonika followed the retreating Bulgarian Army into Bulgaria. The districts affected were, principally, that of Kilkis (Kukush) and, to a lesser degree, Goumentza, Demirhisar and Seres. The total number of Bulgarians who migrated at this moment was about 15,000.†

(3) 1913. Towards the end of that year the whole Greek population of the Macedonian districts ceded to Bulgaria by the Treaty of Bucharest (qazas of Jum'a-i-Bala, Razlog, Melnik, Nevrokop, Strumitsa) emigrated to Hellenic Macedonia. They numbered about 5000.‡

(4) 1913. A similar movement took place from the Macedonian districts ceded to Serbia (qazas of Monastir, Gevgeli and Doiran). The Greeks from these districts, to the number of about 5000,§ settled for the most part at Salonika, Florina, and Kilkis.

(5) 1913. At the same time the Greek population of the Caucasus, excited by the news of the Greek victories in Macedonia and by reports of free distribution of land, started to emigrate. Although the movement was discouraged by the Greek Government, which already had its hands

* The reference is exclusively to Greek Macedonia. Although both Serbian and Bulgarian Macedonia have been considerably affected by the migrations, a large number of Moslems in particular having emigrated during the years 1912–1914, the writer is not in possession of the necessary figures to be able to include these territories in his survey.

† According to the figures of 1914 (see Virgilj, 'Questione Rumeliota,' 2, 254), the Bulgarian population of the qaza of Avret-hisar (= Kilkis) was 16,138.

‡ See the report on the settlement of the refugees in Macedonia published by the Hellenic Ministry of Finance (pp. 15–17).

§ Information supplied by members of the Community of Monastir.

full with other refugees, some 5000 * Caucasian Greeks succeeded in being admitted into Macedonia.

(6) 1913–1914. As the result of the action of the Bulgarian Government in Western Thrace, which territory had been ceded to Bulgaria by the Treaty of Bucharest, and the settlement there of Bulgarian emigrants from Macedonia, practically the whole of the Greek population were forced to emigrate. Of these some 40,000 settled in Macedonia, others going to Old Greece.

(7) 1914. After the conclusion of peace between Turkey and the Balkan States, the Young Turkish Government started a vigorous propaganda among the Moslem inhabitants of the ceded districts, to induce them to emigrate to Turkey. Although Western Macedonia was hardly affected, a considerable portion of the Moslems of Central and Eastern Macedonia, estimated at 100,000–115,000,† left for Turkey and were settled in Eastern Thrace and on the western coast of Anatolia.

(8) 1914. With the object of bringing pressure to bear upon the Greek Government to surrender the Ægean Islands which had been occupied by Greece during the first Balkan War, the Young Turkish Government proceeded to expel, during the summer of this year, a portion of the Greek population of Eastern Thrace and the Asiatic littoral. About 100,000 ‡ of these refugees (80,000 from Thrace and 20,000 from Anatolia) took refuge in Macedonia, where they were settled by the Greek Government.

(9) During the European War the Bulgarian Army occupied Eastern Macedonia, and all the Greek inhabitants—to the number of 36,000 §—were deported to Bulgaria.

(10) 1918. Immediately after the Armistice the survivors of the above deportation—to the number of 17,000 ‖ only—were brought back and reinstated in their homes.

(11) 1918–1919. The successive occupations of Western Thrace, Eastern Thrace, and Smyrna by the Greek Army were followed by the re-emigration of the Greeks who had been expelled from these countries

* The report on the settlement of refugees in Macedonia published by the Greek Ministry of Finance (p. 20) gives 3260. This figure includes only those emigrants who received help from the Government, but a considerable number had independent means and so were not included in the official statistics.

† Previous to 1912, the total number of Moslems in the part of Macedonia subsequently ceded to Greece was about 473,000. In 1924, when all the Moslems of Macedonia were exchanged, their total number, as registered by the Mixed Exchange Commission, was only 348,000. As there had been no emigration between the years 1915 and 1923, it follows that the difference between the above two figures, namely 125,000, represents the total of Moslems who left during the period 1912–1914.

‡ According to the "Report on the settlement of refugees in Macedonia" (pp. 12–32), the number of refugees who received help from the Government was 81,333. Allowance must also be made for those who received no relief and so were not registered.

§ See M. Ailianos, 'L'œuvre de l'Assistance Publique Grecque' (Greek edition), p. 58.

‖ *Ibid.*, p. 58.

in 1913–1914. The total number repatriated from Macedonia was about 140,000.

(12) 1919–1920. In the course of 1919 the Greek Government decided to remove to Greece the Greeks of South Russia and the Caucasus, many of whom had been reduced to the condition of refugees by the Bolshevik Revolution. Of these, 55,000* were settled in Macedonia.

(13) 1919. After the defeat of General Wrangel by the Bolsheviks at Odessa and in the Crimea, a portion of the Russian White Army, including large numbers of Russian civilian refugees, was transported to Greece. Of these about 1000† were settled at Salonika.

(14) 1919–1924. In 1919 a Convention was signed between Greece and Bulgaria to facilitate the reciprocal emigration of the Greek and Bulgarian minorities in the two countries. Under this arrangement 27,000‡ Bulgarians had quitted Greek Macedonia for Bulgaria up to the end of 1924.

(15) 1922–1924. After the Greek disaster in Asia Minor practically the whole of the Greek population of Western Asia Minor and the Black Sea littoral (Pontus) took refuge in Greece. Also, immediately after the signature of the Mudania Convention by which the Allied Powers agreed to surrender Eastern Thrace and Constantinople to the Kemalists, the greater part of the Greek and Armenian population of Eastern Thrace and a portion of the Greek inhabitants of Constantinople, fearing reprisals by the Turks, removed to Greece.

Of these refugees, up to 1 November 1924, about 200,000 had been installed in Macedonia and 120,000 in Western Thrace.§

(16) 1923–1924. In January 1923 was signed the Greco-Turkish Convention for the exchange of populations, which differs from the Greco-Bulgarian Convention in that it makes the emigration of the Greek and Moslem minorities in the two countries compulsory, only the Greeks of Constantinople and the Turks of Western Thrace being exempted from its provisions.

This Convention came into operation in October 1923. By November 1924 the whole of the Moslem population of Macedonia, amounting to 348,000‖ persons, with the exception of a few individuals of Albanian origin whom the Greek Government had agreed to exempt from the exchange, had been transferred to Turkey.

(17) 1924. In May of this year the remnant of the Greek popula-

* According to the statistics of the Hellenic Ministry of Relief published by Ailianos (pp. 58–59), there were 1572 from South Russia and 52,878 from the Caucasus.

† The exact figure was 1200 (see 'Ailianos,' p. 61).

‡ According to figures supplied by the Mixed Emigration Commission.

§ The remainder, variously estimated at 5–600,000, are scattered over Old Greece, Epirus, and the Islands.

‖ According to figures supplied by the Mixed Emigration Commission.

tion of Eastern Thrace and Asia Minor began to be transferred to Greece, under the provisions of the same Convention.

By December 1924, at which date the exchange was practically completed, 150,000* Greeks (94,000 from Anatolia, 18,000 from Eastern Thrace, and 38,000† from Constantinople) had been transferred to Greece.

Besides the above-mentioned wholesale migrations, a factor which must also not be overlooked is the settlement in Macedonia, immediately after the Balkan Wars, of considerable numbers of Greeks from Old Greece. Taking into account the Government officials, gendarmes, etc., 10,000 would not be too high a figure. This does not include the army.

Let us now consider the effect of these migrations on the distribution of races in Macedonia and Thrace.

To arrive at an estimate of the relative strength of the various racial elements composing the population it is necessary to take as one's starting-point certain fixed points which are entirely free from conjecture. These are:

(1) The census of the inhabitants of the New Provinces taken by the Hellenic Government, immediately after the annexation in 1913. This, however, gives us only the figures concerning Macedonia, as at that date Western Thrace was still in the hands of Bulgaria.

(2) The census of the population of Greece taken in 1920. This includes both Western and Eastern Thrace, which was then in Greek occupation.

In the censuses of 1913 and 1920, however, there is no classification of the population according to race or religion. In order, therefore, to ascertain what is the racial composition of the population in Macedonia and Thrace at the present day, one must have recourse to various other auxiliary sources of information.

What is of practical importance is to arrive at an accurate estimate of the relative strength of the Greek as compared with the other non-Greek elements. By Greeks we mean that part of the population whose national sentiments are indisputably Hellenic.

It is also of importance to distinguish the Bulgars. Under the Turkish rule this was easy enough, as the Bulgars belonged to the Exarchist Church, and were officially registered as such. Since 1912 there is no such separate registration.

With the assistance, however, of statistics which are available for the period before 1912—that is, before the annexation of Macedonia to Greece—and certain other figures, such as, for example, the number of persons

* The exact figure, as supplied by the Mixed Emigration Commission, is 149,851.

† This refers to persons who settled at Constantinople after 30 October 1918, and who, in consequence, by the terms of Art. 2 of the Convention, are not exempted from the exchange.

who have applied to the Mixed Emigration Commission for permission to emigrate to Bulgaria, it is possible to arrive at a fairly close estimate of the number of Bulgars left.

Further, the Greek Ministry of Relief and the various other Greek official organizations concerned with the relief and settlement of refugees have been obliged, by the very nature of their task, to keep a record of the refugees and emigrants who have at various times either come to or quitted Greece. A point to be noted, however, in connection with these statistics is that they always represent a minimum figure, as refugees of independent means who have not had occasion to apply for Government relief escape registration. For this reason, the real figure is always somewhat in excess of the figure officially recorded.

One factor which it has not been possible to take into account is the normal difference between births and deaths. Abnormal events—wars, deportations, etc.—during the period under review have been so frequent, and so many exceptional factors have operated to produce either an abnormal increase or decrease in the population that a comparison between births and deaths due to normal causes is not feasible.

If, however, one deducts the increase of population due to the influx of refugees, one observes a general decrease in the population, even in those districts which were not directly affected by wars or mass-migrations.

Take, for instance, the case of the two districts of Khalkidikē and Thasos, neither of which was the scene of military operations either during the Balkan or the European War. In each case a comparison of the censuses of 1913 and 1920 shows a decrease in the population. Thus the Khalkidikē, which in 1913 had (exclusive of the monasteries of Mount Athos) 47,636 inhabitants, had in 1920 only 44,304, a decrease of 7 per cent. Thasos, which in 1913 had 15,226, had in 1920 only 12,328, a decrease of 20 per cent. An important contributory cause was doubtless the epidemic of Spanish influenza which took a very heavy toll of the Macedonian population during the winter of 1916. Another factor was also the mortality among the young men who served in the army during the European War.

Taking into account the troubled condition of things which prevailed in Macedonia long before the Balkan Wars, the heavy mortality from malaria which is general throughout the country, and the low standard of living among the Macedonian peasantry, it may be safely assumed that at no period during the last twenty to twenty-five years was there an excess of births over deaths. In the absence of more precise information, we have assumed, for the purposes of our estimates, that during the period under review births and deaths balance.

In 1913 the population of Greek Macedonia, according to the census taken in that province by the Hellenic Government immediately after the annexation, was 1,194,902. At the census of 1920 it had fallen to 1,120,079, a decrease of 7 per cent.

In order to be able to explain the cause of this decrease and to ascertain how the relative strength of the various racial elements composing the population of Macedonia has been affected, one must take into account all the migrations which, during the intervening period between the two censuses, resulted in either an increase or a diminution in the strength of each separate racial unit.

It is also necessary to know what was the relative strength of these units at the beginning of the period, that is, just before the Balkan Wars. This information is available from various auxiliary sources.

We take, as our starting-point, a statistical table of the population of Macedonia, by races, published by the Greek Government in 1904 and derived from Greek and Turkish official sources.*

This table gives us the following official composition :

Greeks	523,472
Bulgars	119,005
Moslems	404,238
Various	68,902
	1,115,617

This total of 1,115,617 seems to be below the mark. If, as the census shows, the population in 1913 was 1,194,902, that is, at a date when the Turkish and Bulgarian elements had suffered an abnormal reduction as the result of the two Balkan Wars, it is certain that in 1904 it must have been considerably larger instead of less by 80,000.

An examination of the details of the table of 1904 leads one to the conclusion that the Moslem element, returned at 404,238, has been considerably understated. The reasons for this are patent.

In 1924, we know from the careful record kept by the Mixed Commission for the exchange of populations between Greece and Turkey, that the number of Moslems who left Greece at the time of the exchange (1923–1924) was 348,000. Although we have no exact record of the number of Moslems who perished during the Balkan Wars or emigrated to Turkey immediately after the close of those wars in 1914, there is

* The figures in question were published in the *Bulletin d'Orient* of 1904 and also in the *Temps* of 27 December 1904, and are reproduced in Virgilj, 'La Questione Rumeliota,' pp. 233–4.

The figures include, under the heading of Greeks, the Slavophone Macedonians acknowledging the authority of the Œcumenical Patriarch, and, under the heading of Bulgars, the Slavophone Macedonians acknowledging the authority of the Bulgarian Exarch, as, under the Turkish regime, ecclesiastical allegiance was the test of national sympathy. Koutzo-Vlachs, for the same reason, are classed as Greeks, unless they had officially registered as "Roumans." This classification, based on the principle of national sentiment, does not, of course, pretend to take account of the much-disputed question of the racial origin of the various elements of the population. In the Lausanne Convention for the exchange of populations (1923), ecclesiastical allegiance was accepted as the determining test of national sympathy.

evidence to show that their number could not have been less than 125,000.*

This being so, it is safe to say that the Moslem population of Greek Macedonia on the eve of the Balkan War (1912) was in the neighbourhood of 470–480,000.

The figures of 1904, quoted above, also contain an error as regards the Jewish population of Salonika, which is given as 46,000. According to the figures supplied by the Jewish Community of that city, the Jewish population in 1912 was round about 76,000. The figure quoted for 1904 under "Various" should therefore be increased from 68,000 to 98,000.

By taking the table of 1904 as a basis and amending it in respect of the Moslems and Jews, we arrive at the following figures, which certainly represent the minimum strength of the various elements of the population on the eve of the Balkan Wars:

Greeks	513,000	42·6 per cent.
Bulgars	119,000	9·6 „
Moslems	475,000	39·3 „
Various	98,000	8·2 „
	1,205,000	100·0

We start then with the above figure of 1,205,000 as the population in 1912.

In order to arrive at the figure of the Greek census of 1913, we must take account of the following additions and subtractions which took place between the outbreak of the Balkan War (October 1912) and the taking of the census in 1913.

The changes may be tabulated as follows:

(1) Total population on the eve of the Balkan Wars ...	1,205,000
(2) Minus the Moslems who emigrated during the course of the Balkan Wars	− 10,000
(3) Minus the Bulgars who emigrated at the same period	− 15,000
(4) Plus the Greeks who came from Old Greece (officials, new settlers, etc.)	+ 10,000
(5) Plus the Greek emigrants from the part of Macedonia ceded to Bulgaria by the Treaty of Bucarest ...	+ 5,000

Taking the above movements into account, the figure of 1,195,000 shown as that of the total population of Greek Macedonia at the census of 1913 may be analysed as follows:

Greeks	528,000
Bulgars	104,000
Moslems	465,000
Various	98 000
	1,195,000

* According to the official statistics of the Turkish Ministry of the Interior quoted by Antoniades ('Le développment économique de la Thrace'), the total number of

We have next to consider the population as it was in 1920, the date of the next official census. This shows a total population, for the same area, of only 1,122,000, that is, a decrease of 6 per cent. on the total of 1913.

This decrease explains itself when one takes account of the following movements which took place during the interval 1913–1920. We have:

(1) Census figure of 1913	1,195,000
(2) Plus the Greek emigrants from the Macedonian districts ceded to Serbia by the Treaty of Bucharest ...	+ 5,000
(3) Plus the Greek emigrants from the Caucasus	+ 5,000
(4) Plus the Greek refugees from Bulgarian Thrace expelled in 1913–1914	+ 40,000
(5) Plus the Greek refugees from Turkish Thrace expelled in 1914	+ 80,000
(6) Plus the Greek refugees from Asia Minor expelled in 1914	+ 20,000
(7) Minus the Moslems who emigrated at the close of the Balkan Wars (1913–1914)	− 115,000
(8) Minus the Jews who emigrated from Salonika during the same period	− 2,000*

After making allowance for the above, we arrive at the following figure, which represents the composition of the population at the end of 1914:

Greeks	678,000
Bulgars	104,000
Moslems	350,000
Various	96,000
	1,228,000

The next period to be considered is the years 1915–1918. We have:

(1) Population at the beginning of 1915	1,228,000
(2) Minus the Greeks of Eastern Macedonia deported to Bulgaria during the European War	− 36,000
(3) Plus the Greeks of Eastern Macedonia repatriated after the Armistice of 1918	+ 17,000
(4) Minus the Jews who emigrated after the Salonika fire of 1917	− 6,000

This gives us the following result at the time of the Armistice in 1918:

Greeks	659,000
Bulgars	104,000
Moslems	350,000
Various	90,000
	1,203,000

Turkish emigrants who settled in Turkey after the Balkan Wars was 413,922. This figure includes emigrants from Greece, Bulgaria, and Serbia.

* The exact figure supplied by the Jewish community of Salonika is 1600.

Soon after the Armistice began the repatriation of the Thracian and Asiatic refugees settled in Macedonia since 1913–1914. This is followed by the transfer of the Greeks of South Russia and the Caucasus to Greece. We have:

(1)	Total population at the date of the Armistice ...	1,203,000
(2)	Minus the Thracian and Asiatic refugees repatriated to Turkey and Western Thrace	− 140,000
(3)	Plus the Greeks from the Caucasus	+ 53,000
(4)	„ „ „ S. Russia	+ 2,000
(5)	„ Russian refugees of Count Wrangel's army	+ 1,000
(6)	Plus Greek refugees from Northern Epirus (Albanian territory)	+ 3,000

This brings us to the total of the 1920 census—1,122,000—with the following analysis:

Greeks	577,000
Bulgars	104,000
Moslems	350,000
Various	91,000
	1,122,000

The Greek defeat in Asia Minor in 1922 is followed by fresh mass-movements, resulting partly from the actual military operations and partly from the treaties for the exchange of populations.

The present position (up to the end of November 1924) is as follows:

The whole of the Moslem population of Macedonia, with the exception of a small number * of individuals of Albanian origin who were specially exempted from the exchange, has been transferred to Turkey, and their place has been taken by some 700,000 Greek refugees from Eastern Thrace and Anatolia. This last figure includes both permanently and temporarily settled refugees.

During the same period the number of Bulgars has been considerably reduced through the operation of the Greco-Bulgarian Convention for the reciprocal emigration of the Greek and Bulgarian minorities. Some 27,000 Bulgars have already emigrated, and these will shortly be followed by another 10,000 who have filed their emigration applications with the Mixed Commission.

Consequently, after taking account of all the above changes during the period 1922–1924, we arrive at the following figures, which represent the composition of the population of Greek Macedonia at the present day.

Greeks	1,277,000	...	88·3 per cent.
Bulgars	77,000	...	5·3 „
Moslems	2,000	...	0·1 „
Various	91,000	...	6·3 „
	1,447,000		

* The number so exempted, according to information supplied by the Mixed Commission, is 1700.

It is interesting to compare the above figures with those giving the position as it was on the eve of the Balkan Wars. In 1912 the Greeks, though numerically stronger than any other of the racial groups taken separately, only represented 43 per cent. of the total population. To-day, after the changes brought about by the arrival of the refugees and the emigration of the Moslems and Bulgars, the population has become predominantly Greek (88 per cent.), all the other non-Greek elements taken together only amounting to 12 per cent.

Western Thrace.

Before the Balkan Wars this territory, according to the official Turkish census of 1902, had a population of 237,000.*

The Greek census of 1920 shows, for the same area, a population of 191,000.†

This considerable decrease is due to the causes enumerated below.

The Turkish figures of 1902 give the following analysis:

Greeks ...	87,000	36·7 per cent.
Bulgars ...	35,000	14·7 „
Moslems ...	111,000	46·8 „
Various ...	4,000	1·8 „
	237,000	100·0

In 1913, after the annexation of Western Thrace to Bulgaria, the whole of the Greek population of 70,000 was forced to emigrate. At the same time 49,000 ‡ Moslems emigrated to Turkey under the terms of the Turco-Bulgarian Convention of 1913 for the exchange of the populations along the Thracian frontier. In 1919, after the Armistice, 51,000 § Greeks returned from Macedonia and other parts of Greece where they had been settled since 1913.

Taking the above movements into account, one arrives at the following conclusion as regards the racial composition of the 191,000 inhabitants shown in the census of 1920:

Greeks ...	68,000
Bulgars ...	35,000
Moslems ...	84,000
Various ...	4,000
	191,000

During the period 1920–24 the population was increased by the addition of 125,000 || refugees, of whom 5000 were Greeks from the

* The exact figure is 236,896 (see Antoniades, p. 211).

† The exact figure is 191,376 (see Antoniades, p. 211).

‡ The official Turkish statistics (see Antoniades, p. 178) gives 9714 families, that is, about 48,570 persons. Part of these came from districts not included in Hellenic Western Thrace.

§ See Antoniades, p. 41.

|| Of these about 99,000 may be considered as permanently settled.

Caucasus or Old Bulgaria, 116,000 Greeks from Turkey, and 4000 Armenian and Caucasian refugees. On the other hand, some 12,500 Bulgars emigrated to Bulgaria.

It follows that, after the changes mentioned above, the present composition of the population is about the following:

Greeks	189,000 ...	62·1 per cent.
Bulgars	23,000 * ...	7·5 „
Moslems	84,000 ...	27·6 „
Various	8,000 ...	2·8 „
	304,000	100·0

Thus the Greeks, who before the Balkan Wars were only 36 per cent. and so in a considerable minority as compared with the Moslems, to-day have a majority over all the other racial units put together.

Eastern Thrace.†

If the effect of the migrations mentioned in the previous sections has been to make Macedonia and Western Thrace predominantly Greek, the result of these same migrations has been to make Eastern Thrace predominantly Turkish. Whereas before 1912 the Greek element was in a slight majority, to-day, as the result of the exchange of populations, not a single Greek is left between the Maritsa and the municipal boundaries of Constantinople.

As for the Bulgarian element, the greater part had already quitted the country in 1913 as the result of the Turco-Bulgarian Convention for the exchange of the frontier populations.

Thus Eastern Thrace to-day is, to all intents and purposes, a purely Turkish country.

The census taken in 1920, when Eastern Thrace was still under Greek occupation, shows a total population of 513,000.‡ Before the Balkan Wars it was, according to the official Turkish statistics, about 569,000. §

The decrease may be accounted for as follows:

Taking as a basis the Turkish figures of 1901–02, one gets the following analysis before the Balkan Wars:

* Practically all these have filed applications with the Mixed Emigration Committee stating their desire to emigrate to Bulgaria, and will leave probably in the course of the year 1925. Their place, if not already filled by refugees from Turkey, will be taken by Greek emigrants from Bulgaria, of whom 20,000 are expected to arrive in the course of this same year. After the completion of these migrations, the composition of the population of Western Thrace will be: Greeks, 70 per cent.; Moslems, 27 per cent.; various, 3 per cent.

† By Eastern Thrace here is meant the portion of Eastern Thrace which was ceded to Greece by the treaty of Sèvres and subsequently reoccupied by Turkey in 1922.

‡ The exact figure is 512,832.

§ The exact figure is 568,564 (see Antoniades, p. 211).

Greeks	253,000 * ...	44·5 per cent.
Bulgars	50,000 † ...	8·7 „
Moslems	223,000 ...	39·1 „
Armenians	24,000 ...	4·2 „
Various	19,000 ...	3·5 „
	569,000	100·0

During the period 1912–15, the following changes took place:

(1) Population in 1912	569,000
(2) Minus the Moslems who emigrated during the first Bulgarian War at the time of the advance of the Bulgarian Army to the Chatalja lines	− 104,000
(3) Minus the Bulgars who emigrated when the Turkish Army re-occupied Thrace in 1913	− 2,000
(4) Plus the Moslem emigrants who arrived from the Macedonian provinces ceded to Greece, Serbia, and Bulgaria in 1914	+ 132,000 ‡
(5) Plus the Moslems who emigrated from Bulgarian Thrace under the Exchange Convention of 1913 ...	+ 49,000
(6) Minus the Bulgars who emigrated to Bulgaria under the same Convention	+ 47,000 §
(7) Minus the Greeks expelled in 1914	− 115,000 ‖

Making allowance for the above changes we get the following result as representing the composition of the population at the beginning of 1915:

Greeks	138,000
Bulgars	1,000
Moslems	300,000
Armenians	24,000
Various	19,000
	482,000

The years 1915–16 witnessed the second expulsion of the Greek population, when a large number were deported to Anatolia. The

* Antoniades (p. 211) makes them 263,014, but he seems to have included in the total, by mistake, a certain number of Bulgars. See next note for the reason.

† Antoniades (p. 211) makes them 40,295. This is obviously too low, as the number of Bulgars exchanged in 1913, according to the official Turkish figures quoted by Antoniades himself, was 46,764. Taking into account that, even after the exchange, there remained about 1000 Bulgars in the Sanjaq of Kirk Kilisse and that allowance must also be made for the losses incurred by the Bulgar population during the re-occupation of the country by the Turkish army of 1913, one may safely say that the Bulgar population, on the eve of the Balkan Wars, was close on 50,000. I have adopted this figure.

‡ This is the figure given in the official statistics of the Turkish Refugees Department quoted by Antoniades (p. 217).

§ This figure probably includes some of the Bulgars who fled into Bulgaria during the advance of the Turkish army to Adrianople in 1913. They were included *a posteriori* in the Turco-Bulgarian exchange of populations.

‖ The exact figure, as given by Antoniades (p. 219), is 114,657.

number of these deportees was 85,000.* This reduced the Greek population to about 53,000

About 17,000 Armenians were also deported at the same time.

In 1918, after the Armistice of Mudros, the Greek Government, with the assistance of the Allies then in occupation of Constantinople, repatriated all the Thracian Greeks both from Anatolia and Greece. According to the official figures of the Greek Ministry of Relief, during the period 1918–20, 50,000 † were brought from Anatolia and 83,000 ‡ from Greece.

These figures enable us to analyse the total of 513,000 given in the census of 1920 as follows:

Greeks	186,000
Bulgars	1,000
Moslems	300,000
Armenians	7,000
Various	19,000
	513,000

The disaster of Smyrna in 1922 and the signature of the Mudania Convention by which the Allied Powers consented to allow the Turks to re-occupy Constantinople and Eastern Thrace, was immediately followed by the emigration of practically the whole Greek and Armenian population of this province. At the end of 1922, after the Turkish re-occupation, there were only 1177 § Greeks left in the whole of Eastern Thrace (excluding the Chatalja district). This small remnant was also transferred to Greece in 1924, under the Turko-Greek Convention for the exchange of populations.

The place of the Christian population was filled by Moslems from Greece similarly exchanged. About 70,000 || of the latter had been settled in Thrace up to the end of November 1924.

Consequently, the present composition of the population in Eastern Thrace (exclusive of the Chatalja district) is approximately the following:

Greeks	0	...	0·0 per cent.
Bulgars	1,000	...	0·3 ,,
Moslems	370,000	...	95·0 ,,
Various	19,000	...	4·7 ,,
	390,000		100·0

A comparison of the above figures with those of 1912 shows that, firstly, there has been a decrease in the total population of 25 per cent.; secondly, that the Moslems, who before the Balkan Wars were only 39 per cent. of the total, to-day are 95 per cent. The remaining 5 per

* The exact figure given by Antoniades (p. 221) is 84,799.
† The exact figure given by Antoniades (p. 223) is 49,721.
‡ The exact figure given by Antoniades (p. 50) is 82,874.
§ Figure supplied by the Mixed Commission.
|| From statements published in the Turkish press.

cent. are Jews, foreigners, and a few Bulgars. It is to be noted that the Turkish Government has refused permission for the Bulgars who fled to Bulgaria in 1913 to return.*

As regards Chatalja, the Greek population of this district, numbering 17,404, was also exchanged in June 1924. This was followed by the exchange of the Greek inhabitants of the villages belonging to the vilayet of Constantinople, but outside the municipal boundaries of that city.

Consequently, the only Greeks left in European Turkey to-day are those inhabiting the city of Constantinople itself, who are specially exempted from the exchange by Art. 2 of the Lausanne Convention of January 1923.

COMPARATIVE TABLE SHOWING THE RACIAL COMPOSITION OF THE POPULATION OF MACEDONIA AND THRACE DURING THE PERIOD 1912–1924.

A. *Macedonia.*

	1912.†	1913.	1915.	1920.	1924.‡
Greeks	513,000	528,000	678,000	577,000	1,277,000
Bulgars	119,000	104,000	104,000	104,000	77,000
Moslems §	475,000	465,000	350,000	350,000	2,000 ‖
Various ¶	98,000	98,000	96,000	91,000	91,000
	1,205,000	1,195,000	1,228,000	1,122,000	1,477,000

B. *Western Thrace.*

	1912.†	1915.	1920.	1924.‡
Greeks	87,000	17,000	68,000	189 000
Bulgars	35,000	35,000	35,000	23,000
Moslems	111,000	84,000	84,000	84,000
Various	4,000	4,000	4,000	8,000
	237,000	140,000	191,006	304,000

C. *Eastern Thrace.*

	1912.†	1916.	1920.	1924.‡
Greeks	253,000	53,000	186,000	0
Bulgars	50,000	1,000	1,000	1,000
Moslems	223,000	300,000	300,000	370,000
Caucasus	24,000	7,000	7,000	0
Various	19,000	19,000	19,000	19,000
	569,000	380,000	513,000	390,000

* The Turco-Bulgarian Convention of 1913 only provides for the exchange of the Bulgarian population to a depth of 15 kilometres from the frontier. Many of the Bulgarians who fled across the frontier in 1913 came from further inland and could not strictly be included in the exchange. The Turkish Government, however, has consistently refused to permit their repatriation.

† On the eve of the Balkan War.

‡ At the end of the year.

§ Includes Turks, Pomaks, Albanians, Valaades, and Moslem Gypsies.

‖ Moslems of Albanian origin exempted from the Exchange of populations.

¶ Jews, Roumanized Vlachs, Uniates, Albanians, foreigners.

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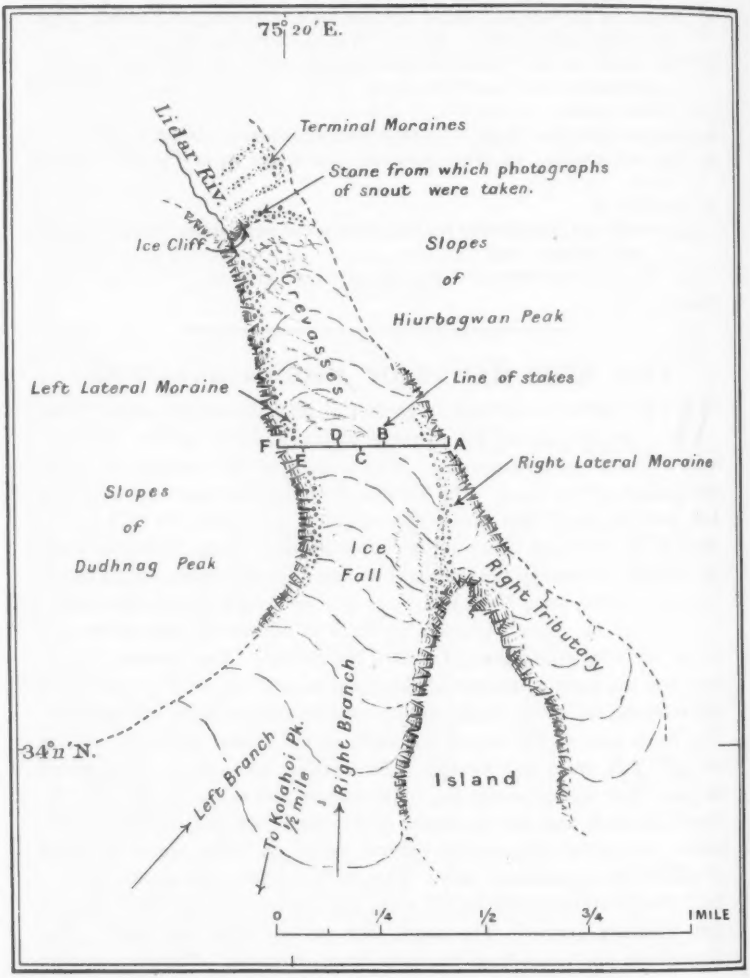
   (*b*) Mixed Commission for Greco-Bulgarian emigration.

Athens, 1925.

THE MOVEMENTS OF INDIAN GLACIERS

WE have received from Sergt. A. Coleman, Army Education Corps, an account of his marking of the Kolahoi glacier, Kashmir, with a number of photographs. With a party of four natives, he visited the glacier in June 1923. The snow in the mountains was then unusually low, and the glacier was covered to a depth of 3 to 4 feet, the only indications of its existence being at the upper ice-fall. Sergt. Coleman made no attempt to survey the glacier, but based his sketch-map upon the 1″ Survey of India, sheet No. 43, N/8, 1915. Two of his photographs, taken from a large flat-topped boulder 20 yards in advance of the eastern end of the ice cliff, give a general idea of the glacier. That showing the ice cave and the issuing streams of the Lidar should be useful in estimating the retrocession of the snout, as the large boulder is easily recognizable. The birch tree on the top of the knoll in the centre was on a bearing of 244° T.B. from this boulder. In marking the glacier, he intended to place five stakes across the main stream below the ice-fall, but the depth of snow and the shortness of his visit curtailed his plans. He chose two easily recognizable natural marks on either side: drawings of which are reproduced here. The mark on the right bank (A) is a deep almost vertical cleft in the rock, just north of the junction with the east tributary glacier. The south side of this mark was used. The photograph was taken from the right lateral moraine. The mark on the left bank (F) is a black, shallow, almost vertical, cleft in the rock wall below a solitary birch, bearing 272·2° T.B. from A. The distance between these marks is 2410 feet. On the left lateral moraine he set up a cairn (E) which he intended to be in line with these two marks, but through magnetic influence on the compass, it was placed too far south,

bearing 271½° T.B. from A. Three stakes, each about 7 feet long, were placed at intervals across the glacier in line with A and the cairn. Two other posts were dragged into approximate position, but were not set up. A very rough measurement would prevent their being mistaken



Sketch-map of the Kolahoi Glacier, showing Line of Stakes.

for fallen posts. They are next to point A and the cairn respectively. Sergt. Coleman has deposited copies of his report and photographs with various bodies, including the Geological Survey of India. Kolahoi glacier is in an accessible part of Kashmir, and subsequent observations

will afford evidence of the fluctuation of Himalayan glaciers. We would be glad to receive further details from subsequent visitors to the Kolahoi glacier on this point. Dr. E. F. Neve stated in the *Alpine Journal* (25, (1910), p. 40) that from his own knowledge the Kolahoi between 1887–1909 had receded quite a quarter of a mile. He further estimated, from a study of the Trigonometrical Survey map of 1857, that it had probably retreated more than a mile in the succeeding fifty-two years.

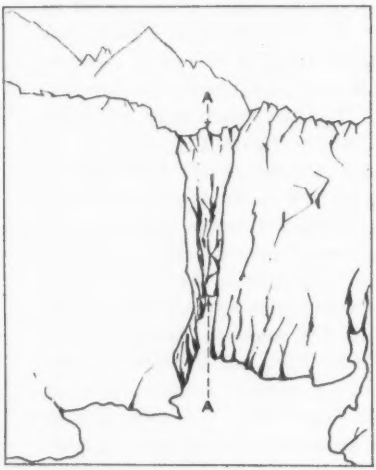
Sergt. Coleman has therefore carried out a commendable piece of work, and it is to be hoped that his example will be followed by others. The value of such observations in the Himalayas has long been appreciated. In 1905 Mr. D. W. Freshfield, on behalf of the Commission International des Glaciers, brought the matter to the notice of Sir S. G. Burrard, by whom it was referred to a sub-committee of the Board of Scientific Advice, consisting of Col. F. B. Long, Dr. G. T. Walker, and Sir T. H. Holland. The sub-committee drew up a scheme of observations and recommended that it should be carried out under the direction of the Geological Survey Department. The first results were published in 1907 in the *Records of the Geological Survey of India* (35, 127–57).

The reports contain a brief general description of each glacier, evidence of recent fluctuation, and an account of its demarcation illustrated with plates and sketch-maps. Altogether twelve glaciers were examined. In the Kashmir region, six were surveyed and marked by H. H. Hayden. Of the Barche and Hinarche glaciers in the Bagrot valley, he reported that the former had retreated comparatively recently, though whether this was truly secular or merely seasonal fluctuation was doubtful. The second appeared to have advanced since Sir Martin Conway's visit in 1892 : the natives spoke of periodic six-year cycles of fluctuation. He also examined three in Nagir State. The total amount of the retreat of the Minipin glacier in historical times appeared to have been considerable : at the moment of his visit it was advancing slightly. The Hispar glacier had also retreated in fairly recent times. Conway in 1892 thought it practically stationary, but since then it had retreated, though not more than a few hundred yards. Two years after Hayden had marked this glacier, further observations were made by Dr. Calciati on the Workman expedition. During that interval it had retreated about 12 metres. The Yengusta glacier was of particular interest, as about 1902 it had suddenly advanced about 2 miles. It was also examined by Calciati in 1908, and found to have retreated about 98·6 feet since 1906 : this may have been merely summer contraction. The Hassanabad glacier is another example of recent rapid advance : about 1904 it advanced a distance variously computed to be from 6 miles to one day's march. It was examined by Dr. Workman in 1908 ; from Hayden's data he concluded that it had not moved in the interval.

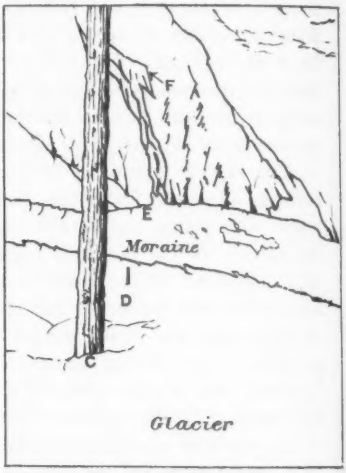
In Lahaul Messrs. H. Walker and E. H. Pascoe examined and marked two glaciers, Bara Shigri and Sonapani. Both showed signs of retreat. The

remaining four, in Kumaon, the Pindari Milam, Shan Kulpa, and Poting, were visited by Messrs. G. de P. Cotter and J. C. Brown. In all cases, except perhaps the last, local tradition recorded a recent retreat: of the first, J. W. A. Mitchell wrote in 1894 that it appeared to have retreated about 100 yards in the previous ten years; according to "A. K." the second had retired 800 yards in fifty-seven years, and a slight retreat of the third was also recorded. The Poting glacier was apparently stationary, as the terminal moraines in front of it did not look recent. It was examined five years later by Captain Grinlinton, who found the snout was in approximately the same position as in 1906.

In 1909 two glaciers in Sikkim, the Alukthang and Zemu, were marked by Mr. T. H. D. la Touche (*Records Geolog. Survey, India*, 40,



Mark A on right of Glacier.



Marks C, D, E, and F.

52–62). Neither appeared to have moved since Mr. Freshfield's visit in 1899; though from the evidence of Major Sherwill the first may have retreated half a mile since 1861. Captain (now Major) Grinlinton, in September 1912, also examined six glaciers in Kumaon—the Sona, Baling, Naulphu, Nipchungkang, Kharsa, and Chingchingmauri glaciers. His account (in *Records Geolog. Survey, India*, 44, 280–335) gives details of the position of the snouts. We understand that he has since made further observations, and it is to be hoped that these will be published in due course.

The details of the markings of these glaciers were obtained from the *Records Geological Survey of India*, for the years 1907 to 1914. As no further information on the subject has been published in the *Records*, it would appear that this important work has been abandoned, at least for the present. It is to be hoped that circumstances will permit its speedy resumption.

LORD CURZON'S POSTHUMOUS WORK ON INDIA

British Government in India. The Story of the Viceroys and Government Houses.— The Marquis Curzon of Kedleston, K.G. 2 vols. London, etc.: Cassell & Co. [1925.] 11½ × 8¾, pp. xx. + 260, x. + 268. *Portraits and Illustrations.* £3 3*s. net.*

UNDER the title 'British Government in India' Lord Curzon discourses in two sumptuous volumes on many men and matters associated with a century and a half of British rule over that continent. The work was intended by its author to be—and the reader will assuredly decide that the intention has been splendidly fulfilled—both the payment of a debt to Calcutta and a tribute to the memories of the great office of Viceroy and to the undying magic of India and its people. Though many interesting side-lights are thrown by it upon history, the book does not purport to be an historical work. It can best be described, perhaps, as a canvas on which is depicted the manner of life of an Indian Viceroy, with special attention paid to the background against which the drama of Indian Vice-regal life is played. Indeed, the book as originally conceived was to have been a history of Government House, Calcutta, "that stately building by far the finest Government House in the Empire," for which posterity is indebted to the imagination and imperious temper of Lord Wellesley, who, a century and a quarter ago, determined on and accomplished the building of it without the permission, or even the knowledge, of his employers, the directors of the East India Company in London. The first volume is dominated by the original idea, and nearly the whole of it is devoted to an elaborate drawing of the background of the picture.

Incidentally, as we study the painting, we obtain many interesting glimpses of the personality of the artist. One of Lord Curzon's outstanding characteristics—his industry and thoroughness—is immediately apparent. When he took up a subject he could not rest until he had probed it to the bottom. Hence we find two chapters given up to a laborious examination of the claims of a large number of buildings in various parts of Calcutta to have served either as Government Houses or as Council Houses, before Lord Wellesley's palace came into being. However valuable these pages may be to the student concerned with the *minutiæ* of history, they will be likely to excite the admiration of the general reader for the industry and critical ability of their author rather than his interest in their actual subject-matter. Thereafter we come to the central feature of the background, to the history of which and to whose exterior and interior features—its grounds, its marble halls, its pictures, and its furniture—more than one-third of the first volume is dedicated. The well-known resemblance of the building to Lord Curzon's own home in Derbyshire is naturally dwelt on, and the part which this coincidence played in shaping his own career is admitted. "Perhaps it may be regarded as an illustration of the small points on which even the larger issues of life depend, that it was the alleged correspondence of the two houses that first turned my attention, when a boy, to India, and planted in me the ambition from an early age to pass from a Kedleston in Derbyshire to a Kedleston in Bengal."

The author gives a detailed description of the rooms of Government House which will recall many memories to those who are familiar with the building, and will give an adequate idea of its size and magnificence to those who are not. With consummate skill he displays one by one before the reader's eyes sketches drawn with extraordinary fidelity of its historic chambers—of the great pillared hall and throne room in the body of the building, of the council chamber in the north-east wing (south-east on p. 113 is an obvious slip), and of the great

room with the veranda in the south-west wing which has witnessed "discussions as agitated and decisions as heavily charged with fate as any private apartment within the wide circumference of the British Empire," and in which day after day "from 10 a.m., with the exception of an hour or two for meals or a public function, or a drive, until 2 a.m. on the following morning or sometimes later," Lord Curzon sat and laboured during the period of his own vice-royalty.

In the course of his narrative he demolishes some treasured traditions, notably, that which attributes the glittering array of chandeliers in the ballroom, and various other objects, to captures from the French and Dutch by British men-of-war. But if he plays the part of an iconoclast in the case of some cherished legends, he has made up for it by some notable additions to the amenity and adornment of Government House itself. One of the features of the interior decoration of the building is its series of cool grey marble floors. These have been added to from time to time. Lord Ripon extended the marble flooring of the throne room to the south veranda behind the throne. Lord Curzon, the better to display this feature of the building, removed the carpets which he found covering it in the throne room, and paved the central basement hall with the same material. "A Royal visit," he writes, "lends a tremendous and highly esteemed fillip to the furniture of Government Houses in all parts of the world." In recent times a Governor of Bengal was fortunate enough to find himself in a position to prove the truth of this *obiter dictum*, and in anticipation of the visit of H.R.H. the Prince of Wales to Calcutta in December 1921, was able to extend the marble flooring to the great segmental corridors leading from the central block to the wings, which he found covered with matting altogether out of keeping with their surroundings. Lord Curzon was at all times an outspoken critic of the transfer of the capital from Calcutta to Delhi, and he naturally laments the disappearance of the Governors-General from the historic setting in which, for more than a century, they had played their part. But he is, perhaps, inclined to write *ichabod* over the portals of the erstwhile seat of the Cæsars, in letters of unnecessary size. When writing of the ceremonial and social demands made upon a viceroy, he mentions a calculation made at his request, which showed that in the month of January—when the Calcutta season is at its height—the number of meals served in Government House in his time amounted to 3,500. It may be of interest, therefore, as showing that, even under the changed conditions which Lord Curzon so greatly deplored, Government House is still capable of living up in some measure to its past traditions, if mention be made of a calculation of a similar kind made twenty years later, which showed that in the month of December 1921 the actual number of bottles of champagne opened—and presumably drunk—within its precincts was one thousand one hundred and fifteen.

But if Government House is the centre, it is by no means the only object of importance in the background which Lord Curzon paints for us. In view of his well-known admiration for Warren Hastings and his charming consort—"the most remarkable man and not the least fascinating woman that ever trod the stage of Anglo-Indian life"—it is not surprising to find a chapter devoted to the numerous houses which from time to time they actually occupied, or were alleged to have occupied. Nor will those who respect and admire his passionate reverence for the historic monuments and buildings of the past cavil—on the ground of a certain incongruity—at the inclusion of a chapter on the "Black Hole" and its monument, around which no little controversy has hitherto raged. All, too, will be glad that he has placed on record an authoritative

account of the Victoria Memorial, "by far the finest structure that has been reared in India since the days of the Moghuls and the most splendid concrete monument of British rule," for the planning of which he was himself responsible. In it we do indeed see the magnificent realization of a brilliantly inspired conception; and few of those who have gazed in silent wonder and admiration upon its glistening dome of pure white marble, rising from the centre of a vast and stately structure of the same material, will be disposed to deny that the building, with the collection which it houses, is a monument worthy of the great epoch whose memory it perpetuates.

When we turn to the second volume we find ourselves still occupied with the background on the canvas. This time it is the park and house at Barrackpore, the country residence first of the Governors-General and now of the Governors of Bengal, which stands on the left bank of the Hughli river 14 miles above Calcutta. And it is not until we have followed the vicissitudes of Lord Wellesley's grandiose project for a second great palace here, from its inception to its eventual completion on a far more modest scale than this autocratic servant of the East India Company intended; and have been familiarized with the life led there by successive occupants; and have visited the various objects of interest from the Hall of Fame to Lady Canning's tomb, and from the Eden School to the staff bungalows which cluster round it, that we come at last to the great living pageant which, with the buildings which have been so carefully depicted as its background, wends its way with due pomp and circumstance down the checkered flights of time. It is true, as Lord Curzon himself reminds us, that in the course of the narrative which he has been relating "we have, in one context or another, come across every occupant of the Governor-General's seat." But hitherto they have been incidental to the story rather than the subject of it. Now they come into their own, and it is here, perhaps, that Lord Curzon is in his happiest vein. One by one he lifts his puppets from the store in which the hand of Time has laid them, and with all the skill of the accomplished showman makes them dance before us. And as they dance we perceive what manner of men they were; how they comported themselves in the environment to which they found themselves transported; their strength and weaknesses; their temperamental idiosyncrasies; the moulds in which their respective characters were fashioned; the varied sources of their failures and successes; all those things, in short, that go to the making of human personality. This is what he does for us; and this is precisely what it was that he set out to do, for, as he tells us, "it is no part of my object to condense the history of India under British rule into a single chapter, or to deal with wars and annexations, with economic or political developments and internal reforms." Such matters are scarcely touched on, and in their place we are given pen portraits of each link in turn of the long chain of Governors-General from "that great and demonic figure standing forth like a rock of granite against the tempestuous background of his time" * to the courtly figure of Lord Lansdowne, "who left in India, as in every office that he has filled, a reputation of the highest distinction." Here the palette and brush are laid aside, for we have reached a date too near to the present to permit him to continue painting with propriety.

Of Lord Curzon himself, as I have already said, we obtain many glimpses as the narrative unfolds. The place which India filled in his own life is apparent from the devotion and palpable delight with which the task of writing of her is

* Robert Lord Clive. Though the office of Governor-General had not been created in his time, he was twice Governor of Fort William in Bengal.

undertaken. Yet there appear at intervals throughout the book, passages of deep pathos in which are to be seen reflected all too plainly the anguish and bitterness of soul which cast so great a gloom over his own departure from her shores. He shows us, for example, each new Governor-General climbing the great stone stairway of Government House to assume charge of his glittering office—" all was then novelty, brave hopes, and high aspirations." And then he tells us of their going—" down them, a few years later, he walked, with feelings very often how different, into the cold dissecting chamber of history." Nor was life behind the bars of the gilded cage the bed of roses which a thoughtless public, blinded by the external glamour of the office, was too apt to suppose. " Amid the fanfare of trumpets and the thunder of the guns, Government House, Calcutta, has sheltered more than its quota of bruised hearts and broken hopes." That is not the least important of the lessons which he seeks to drive home. He would have us realize that " the government of India is not a pastime but an ordeal, not a pageant alone but as often a pain," and that " over the vice-regal throne there hangs not only a canopy of broidered gold, but a mist of human tears." As he compiles the tragic record of ill health —of " Warren Hastings habitually ailing " ; of " Minto's strength sapped " ; of Dalhousie's life " one of incessant and truly heroic combat with devouring and ever-increasing pain " ; of Canning " turned in a few years into a prematurely old man," there arise memories of those days of ill health and physical suffering with which Lord Curzon himself was too often visited. And when he tells of Warren Hastings compelled " to send his wife home in order to escape a breakdown in her health " ; of Sir John Shore " twice obliged to leave his wife behind " ; of the first Lady Minto who " from the day when her husband started for his great charge never saw him again until his body was carried into the gates of their Scottish home " ; and dilates upon the price which has to be paid " even in the desperate issues where the gates of life and death swing on their cruel hinges," we find ourselves standing with him on the brink of an open and premature grave in which but a few months after they had left the shores of India, the body of " the partner and main author of his happiness in India " was laid to rest. Such, indeed, is the price that has to be paid, and if one opens this book and peruses it with feelings of interest and delight, it is impossible to close it without a sob.

The book will surely live, and it is incumbent upon a reviewer, consequently, to point to any slips that he may have detected in it. On p. 107, vol. **1**, Lord Curzon refers to a picture of Fath Ali, Shah of Persia 1798–1834, and says that it must have been brought to India by one of the Indian missions that were despatched to the Persian Court in the early years of the eighteenth century. Eighteenth should presumably be nineteenth. On p. 113 of the same volume, " south-east wing " should be " north-east wing." On p. 139 of vol. **2**, occurs a curious error. " It has always struck me as an astonishing thing," writes Lord Curzon, " that the enthusiasm of the Bengalis for Lord Ripon . . . should never have taken the concrete form of raising the funds to erect a statue in his honour. Even if the chill attitude of the European community had denied to him the hospitality of the Maidan, it might have been thought that some other site would be forthcoming. But the gap remains unfilled." This is incorrect. There is in Calcutta a statue of Lord Ripon subscribed for by Bengali money. Nor was it denied the hospitality of the Maidan, for it stands in the company of Lord Lansdowne and Lord Minto on the side of the great red road which runs from the neighbourhood of Government House across the Maidan in the direction of the Victoria Memorial.

R.

A NEW VIEW OF THE VESPUCCI PROBLEM

Amerigo Vespucci: Studio Critico, con speciale riguardo ad una nuova valutazione delle fonti e con documenti inediti dal Codice Vaglienti.—Alberto Magnaghi. Publicazioni dell' Istituto Cristoforo Colombo, N. 10. 2 vols. Rome: Fratelli Treves. 1924 [1925]. 8 × 4¾, pp. 250, 400. *Facsimile Map. Lire* 25.

THIS is a book which certainly demands full and serious consideration, whatever may be the final verdict on the theories propounded. The Vespucci problem is perhaps the most baffling of all problems connected with the history of geographical discovery, and in spite of some four hundred years of discussion it has never been quite satisfactorily solved. When, in 1917, the late Henry Vignaud brought out his careful survey of the whole documentary evidence (see review in *Journal*, **52**, p. 390) it might have seemed that students had only to form their own conclusions on the strength of the material presented. But Prof. Magnaghi puts the whole matter on a new footing, and seeks to upset long-established ideas as to the relative value of the documents now extant; so that it becomes necessary to re-examine the whole question with open mind.

As is known, opinions as to Vespucci's position among the navigators and cosmographers of his time have been extraordinarily conflicting, and he has been the subject of very severe depreciation as well as somewhat extravagant praise. There is no doubt about the high estimation in which he was generally held by his contemporaries; on the other hand, the letter to Soderini, which describes the supposed four voyages and has been generally considered the most authentic source of information, is so marked by vagueness and inconsistencies as to give us no very high opinion of him, if he were indeed its author. The priority over Columbus in the discovery of the American mainland, to be assigned to him if the letter is strictly accurate, and the prevalent feeling that in having his name attached to the New World he filched an honour properly belonging to the Genoese, have no doubt accentuated the controversy. Now the attractive part of Magnaghi's theory is that it in no way tends to exalt one hero at the expense of the other, but so distributes the honours that there is no detraction from the fame of either. While fully upholding the credit of the Florentine, the book appears as a publication of the "Istituto Cristoforo Colombo."

Besides the letter to Soderini (generally known in brief as the *Lettera*), probably printed in Florence in 1505 or 1506, the principal contemporary sources are on the one hand the *Mundus Novus*, a booklet in Latin of which the earliest dated edition is of 1504, and which purports to be a letter to Lorenzo de Medici describing the "third" voyage (the first in the service of Portugal); and on the other MS. copies of three letters to Medici preserved at Florence One of the latter, written on 18 July 1500, describes apparently the first two voyages of the printed *Lettera* thrown into one; the second, written from Cape Verde 4 June 1501 recounts the events of the third voyage down to that point; the third, written from Lisbon after the return, carries on the narrative of the same voyage to its conclusion: this was already printed in 1789 by Bartolozzi. While most commentators have agreed in regarding the two printed versions as alone authentic, Magnaghi reverses the judgment, and regards the MSS. as the only trustworthy sources. Although not in Vespucci's autograph, all of them are contemporary, being found in a collection of documents in the hand of Piero Vaglienti (a known citizen of Florence at the time), which includes, besides those relating to Vespucci, various reports of Florentine

agents in Lisbon (Giovanni da Empoli and others); they are in the main in chronological order, copied no doubt as they came into Vaglienti's hands. Moreover, no motive would have existed for copying them later when their interest would have in great measure evaporated, still less for inventing them. Written in a modest and familiar style, the MS. letters are free from the contradictions and improbabilities of the printed versions, and they harmonize well with similar letters sent home by other Florentines abroad. Convinced, therefore, that these letters claim more attention than they have received, Prof. Magnaghi subjects the printed versions to a critical examination, and finds abundant grounds for thinking them untrustworthy.*

Beginning with the *Mundus*, he takes some pains to prove that the original was in Italian, and that statements to the contrary by publishers of later versions aimed at making it appear that they had used original sources. Many critics have thought it based on a *lost* original, but Magnaghi points to the "Bartolozzi" letter as the real original base, maintaining that the variations from this are due to amplifications by the publisher introduced with the idea of adding to Vespucci's fame; their sources being, he holds, traceable in other documents of the time. In reality, they are so full of inaccuracies as to bring little credit to the hero, and it would be the best service to his memory to relieve him from all responsibility for them. The statement of Walter Lud of St. Dié that the Latin version was made by the architect Giocondo is particularly open to suspicion, for its lame style ill accords with Giocondo's reputation as a man of culture.

Similar arguments are used in respect of the printed *Lettera*, which owed its popularity largely to the Latin translation (the *Quatuor Navigationes*) added by the St. Dié scholars to the *Cosmographiæ Introductio* of 1507. The name of Soderini, as the high personage to whom it purported to have been sent, has been thought to vouch for its authenticity, but it is the Vaglienti MS. copy, and not the printed version, which first mentions Soderini, whose name may have been added by Vaglienti at a guess. The dedication of the *Quatuor Navigationes* to Duke René of Lorraine, and the claim that the book was based on a *French* version received at first hand from Vespucci, is held to be a fraud perpetrated by the St. Dié clique with a view to masking the dependence of their version on the *Lettera* already published, for the wording of many passages points unmistakably to direct translation from the Italian.

The *Lettera* is held to be, like the *Mundus*, a mere compilation by its publisher from the genuine letters current in Florence, undertaken perhaps not so much for gain as to glorify a fellow-countryman and hold him up as the equal of Columbus even to the number of voyages accomplished. A detailed analysis of its contents shows many grounds for suspicion, only a few of which can be mentioned here. It purports to have been already sent to King Ferdinand of Spain, yet it contains Vespucci's confession that he had left the service of that king abruptly. The comparison of the stature of certain natives with that of an obscure Florentine comes with no air of probability from one who had left Florence twelve years before. In spite of the scruples expressed in addressing a person of high rank, the *Lettera* is in a worse style than any others written at the time by Florentines in Seville or Lisbon. The text seems to be a *rechauffée* and amplification of the *Mundus* by borrowings from various known sources, of which full details are given. A remarkable

* Among the foremost students of the Vespucci problem, Uzielli alone has upheld the genuineness of the Vaglienti MSS., and he unfortunately died before publishing the final results of his researches.

and suspicious fact, not hitherto insisted on sufficiently, is the almost exact agreement between the supposed dates of sailing, and the duration of the several voyages. Again, episodes in the third voyage seem dated at haphazard, there is confusion in the courses sailed, and disproportionate lengths of time are allotted to the separate sections. The voyage is spun out to September 7, while we know from Sanudo that it ended on July 22.

Prof. Magnaghi regards the supposed first voyage as entirely apocryphal, and in this at least he is likely to meet with support. The letter of 18 July 1500 describes one voyage only in the service of Spain, and its division into two (one made in 1497) might be ascribed to the compiler's excessive zeal for the honour of his compatriot, and his desire to show his hero as the first discoverer of the mainland. A hint of jealousy between Columbus and Vespucci does not accord with the friendly terms on which they are known to have stood to each other. Only three place-names are mentioned, and these in unlikely forms and two referring to the same island. The accounts of the first two voyages contain details and even whole sentences taken from the *Mundus* or the Bartolozzi letter describing the third. In this way the wearing of lip-stones by the natives is transferred from south-east Brazil to the northern coast of South America. And some stories or episodes are suspiciously like those recounted in the voyages of Columbus, the letter of Da Cuneo, or even by Marco Polo.

For the fourth voyage there is no independent testimony, and it may have been suggested to the compiler by the hint in the *Mundus* that Vespucci might possibly undertake a second voyage for the King of Portugal. The details given are exceedingly meagre, perhaps because the compiler had already used up his material. A shipwreck is however introduced for the first time, and thus offers a certain variety. Altogether it would be a distinct service to Vespucci's reputation could he be freed from the parentage of the *Lettera* also. On the other hand, the statements of the MS. letters fit in well with what we know from other sources, and there is nothing artificial or superfluous in their form or character.

Having reached these general conclusions in his first volume, the author begins the second with a detailed elaboration of his arguments and a refutation of those of Harrisse, Vignaud, and others who accept the four voyages of the *Lettera*. The grounds for disbelief in the voyage of 1497 certainly seem cogent. It fits in with no otherwise recorded voyage, and it could not have been clandestine since it is positively stated that it was undertaken by order of the king. There are strong reasons for believing, with Humboldt, that Vespucci was continuously in Spain during the supposed duration of the voyage, busy fitting out ships for the third voyage of Columbus. The statements of the *Lettera* cannot be reconciled with the geography of the regions supposed to have been explored, and, with the doubtful exception of the Cantino map, there is no trace of results yielded by the voyage in any map of the time. How, the author asks, could such results have been unknown to La Cosa when drawing his map of 1500, seeing that he and Vespucci were certainly companions on the voyage with Hojeda in 1499–1500? The theory of misdating, according to which the *first* voyage would be that with Hojeda, and the second that of Pinzon or Lepe, is also shown to be untenable.

Having cleared the ground of spurious matter, Prof. Magnaghi devotes several chapters to a setting forth of Vespucci's real achievements as gathered from more trustworthy sources. By rejecting the first and fourth voyages, he reduces those to be credited to Vespucci to two, but those two of such im-

portance as to place him in the forefront of the great navigators of his time. Although he started with Hojeda in 1499, we have no proof that the latter rather than Vespucci himself was commander, and in any case they soon separated, Vespucci completing the voyage on his own account; so that the chief results are to be credited to him. The following facts are in accord with this conclusion: (1) Very soon afterwards Vespucci's services were *solicited* by the King of Portugal; (2) Herrera (an unfriendly writer) accepted the *Lettera* as his sole authority for the voyage; (3) Besides marking a Valdamerigo on the coast visited, subsequent maps long continued to adopt other names as given in Vespucci's letters.

While the earlier voyage (1499–1500) had resulted in the exploration of most of the north coast of South America, that of 1501–02 had equally brilliant results on the eastern coast. Prof. Magnaghi discusses fully the causes which led to the voyage, its probable course, and results. He emphasizes the far-reaching influence of Vespucci on the cosmographical notions of his day, and shows him as the man above all others whose acumen prepared the way for the subsequent feat of Magellan. It was his earlier voyage (together with Cabral's) which impressed upon Portugal the importance of a further exploration of the Brazilian coast, and of anticipating Spain in the discovery of a route by the south-west to the East Indies. The positive gain accruing to the Spanish Crown from Columbus's discoveries had been negligible, while Portugal was already drawing wealth from the Eastern trade, wealth which might be diverted to Spain did the latter find a shorter road. The precise causes which led Vespucci to pass from the service of Spain to that of Portugal can only be guessed at. The voyage as originally planned (in the service of Spain) was to have been entrusted to Diego de Lepe, whose premature death may have caused the project to be dropped, so that Vespucci would be free to offer his services elsewhere. In view of the excellent terms on which Vespucci continued to stand with Spain, Magnaghi suggests as a possible alternative that, whilst nominally serving Portugal, the navigator was all the time really observing how the land lay in the interests of Spain. It is impossible to find in the records of the Portuguese voyages any that can be identified with this of Vespucci's, and the details supplied by the navigator himself are exceedingly scanty, perhaps because he felt it unwise to make the results too widely known. But fuller accounts may have been among the records destroyed by fire at the time of the Lisbon earthquake, and in any case there is sufficient evidence that the voyage did take place, though this was denied by Santarem.

The very scanty details given by Vespucci himself can be supplemented to some extent from contemporary maps such as Canerio's. Many of the names marked here on the Brazilian coast seem derived from Saints' days falling within the period when Vespucci was exploring this coast, and no other voyage known to us could have supplied these details. Down to 1513 the nomenclature ceases at 35° S., but two subsequent maps (Reinel's of *c.* 1516 and the Spanish map of 1523 preserved at Turin), while still using the earlier data, add others which may also be derived from Vespucci, for their origin is still Portuguese, and there is no reason to reject Vespucci's claim to have reached 50° S. Even Magellan's Port St. Julian may have been so named by the Florentine, for the dates of his voyage are consistent with an arrival there on St. Julian's day while those of Magellan's are not. Moreover, Magellan himself speaks of Vespucci as having been already in those parts. If we accept this, Vespucci explored the whole coast from 5° to 50° on his second voyage, and was the first to reach so high a southern latitude. Taken together the

results of his two voyages supplied for the first time a good general picture of the outlines of South America—far better, in fact, than any to be found in Spanish maps of the regions further north until many years later.

Magnaghi holds that all the indications tell against the idea that Vespucci made a second voyage to the Brazilian coast. He seems to have been dissatisfied with his treatment by the King of Portugal, and his move to Seville in the autumn of 1502 seems to show that the latter had by that time decided not to send him again—a decision which hung in the balance when he wrote to Medici two or three months earlier. Spain seems also to have hung back till 1505, when, in February, Vespucci was summoned for consultation with the authorities, and thenceforward till his death he was constantly at work for the Casa de Contratacion or as Pilot Major of Spain. But his influence on Spanish nautical activity was paramount in the years that followed—activity which culminated in the despatch of Magellan in 1519.

No less important was his influence on cosmographical notions and cartography during the same period. Whereas after his first voyage he still held to the belief that the coasts explored were those of eastern Asia, and when starting on the second thought to reach Ptolemy's Taprobana by rounding the supposed great south-east peninsula, such notions had perforce to be given up as the result of the second voyage, which proved to him that the new lands, reaching far to the south of anything known to Ptolemy, formed an entirely distinct continent, separated from the Old World by a broad ocean on the west as on the east. It cannot be a mere coincidence that maps embodying a new and more correct conception of the general distribution of sea and land began to appear from the date of his second voyage, and the whole series named " Lusitano-Germanic " by Harrisse may be held to derive from him, though none actually bears his name. We have definite evidence that he did make maps,* and it is suggested that in the example of about 1502 first reproduced by Hamy (a reduced facsimile of which accompanies the book) we have, if not Vespucci's own work, at least a close copy of a map of his ; for although Portuguese in the main it shows many Italicisms. Maps of this class were a great advance on any made before, and to have inspired them is in itself a strong title to distinction. As indicated by Harrisse's term, they soon made their influence felt in Germany, and it is possible to trace one at least of the channels by which they found their way thither. It is on record that in 1509 Brother Zenobio Acciaioli begged of Luigi Giustiniani (of Florence) copies of a map and globe in the latter's possession showing the new discoveries for the use of " Johannes Teutonicus," whom it is hardly rash to identify with the famous German cartographer Johann Schöner. But Acciaioli had once before borrowed the map and globe, and it is at least possible that he had already sent copies to the other great German map-maker Waldseemüller. The originals may have come from Vespucci himself, who, as noted above, had already sent both kinds of documents to Medici at Florence.

The book concludes with a reprint of three of the Vaglienti documents, including the copy of the MS. printed *Lettera*.

In thus summarizing the results of Magnaghi's study we do not wish to pronounce definitely in favour of all the conclusions reached. Much is of course pure speculation, and not all the arguments carry equal conviction.

* Thus Peter Martyr says that Fonseca, when showing him a Portuguese nautical chart of the new discoveries, told him that Vespucci had a hand in its preparation, and he says himself that he sent Medici a map and globe of his own making.

Some, at least, are double-edged, and while used in support of the thesis in one context, might almost equally well be used against it in another. In fact, the author seems at times to weaken a strong case by undue insistence on points which are at least debatable. He is also a little too much disposed to use his own theoretical conclusions as a base for further deductions, as if they were established facts. But he has at least presented a view which does harmonize in its several parts, and which if accepted would go far to remove the perplexities attaching to this difficult problem.

We cannot help wishing that both the format of the book and the quality of the paper had been more worthy of the subject, but for this its appearance in a series is no doubt responsible. There are some signs of haste in its production, and we are given no guide to the arrangement of the subject-matter: there are not even headings to the chapters, and it is not always easy to see whither the argument is tending at any given point. A good many misprints, too, have escaped correction, especially in the earlier part. It may be hoped that these small defects may be remedied in any new edition that may be called for. E. H.

A FRENCH SOLDIER EXPLORER IN AFRICA

Souvenirs vécus. Quelques Feuillets de l'Histoire Coloniale.— Colonel P. L. Monteil. Paris: Ancienne Maison Challamel. 1924. 9 × 6¼, pp. xiv. + 158. 9 *frs.*

THE little volume of some 150 pages which Colonel Monteil has published recording his personal experiences during an important phase in the development of the French Colonial Empire, with an introduction by General Mangin, is full of interest for the student of political geography. It recalls a period of keen rivalry and at times of acute tension between our two countries in equatorial Africa, but it will nevertheless be read with pleasure by our countrymen because it reveals a sympathetic personality in the gallant soldier and explorer, who writes without conscious prejudice on matters with regard to which he no doubt felt strongly at that time. It is however hardly open to doubt that some of the conclusions he adopted as an executive officer, which were certainly shared by many others in France, were due to misconceptions and attributable to incomplete information from the Government which he served. Since his own contribution to French colonial history has been considerable, these opinions should not remain unchallenged.

Monteil belongs to that illustrious band of pioneers produced by the French army of Africa. Its roll includes names which have became famous in living memory, such as those of Gallieni, Lyautey, Marchand, Mangin, Combes, and many more. Their exploration and administration in savage Africa achieved, as our own has often been, with starved resources, with little encouragement from the public or the legislature, with indomitable perseverance and self-sacrifice in the face of constant difficulties and disappointments, may remind us of what Raleigh, contemplating the results of similar enterprise in another continent, described as the "patient virtue of the Spaniard."

It was under Gallieni as a captain that Monteil as a sub-lieutenant began his African career in Senegal, when the linking of Dakar with the Niger still seemed an elusive dream, and nearly forty years later he found himself once more associated with Gallieni when the latter as Military Governor of Paris so materially assisted in arresting the flood-tide of invasion and in winning

the battle of the Marne. His most conspicuous achievements were his conduct of the expedition which made its way by Lake Chad to Tripoli, to which the present volume contains only a passing reference, and the leadership of that attenuated force, famous in West African annals as the Colonne de Kong, which after a series of actions, in one of which the author was severely wounded, finally dispersed the bands of the truculent and formidable Samory.

In the brief space available only those matters which concern international relations can be critically examined. Among them the following disclosure has particular interest because of the light it throws on Anglo-German relations during the critical period between the accession of William II. and the Great War, when it was the policy of the German Empire to divert the hostility of France by encouraging her to persevere in a colonial expansion which was likely to embroil her with Great Britain.

The Franco-Russian alliance had just received public and emphatic sanction by an exchange of naval visits when in December 1893 Colonel Monteil and M. Haussmann of the Colonial Office were sent to Berlin to negotiate a delimitation of frontier between the French Congo and the Cameroons. Germany was represented by Dr. Kayser, the Director of the Colonial Department, and Baron v. Danckelman. In the initial stages the French negotiators had reason to suspect a deliberate obstructiveness on the part of their German colleagues and could make little headway. In January however there was a change of attitude, and a protocol was almost ready to be initialled when, at the eleventh hour, a number of new points were raised, to the surprise of the French delegates, who consequently resolved to break off negotiations. They were however pressed not to leave the council-room until the matters in question had been referred to the Chancellor (General v. Caprivi). An hour passed before the German delegates returned. Dr. Kayser then with great solemnity pronounced the words, "At the Emperor's command," and both he and his colleague stood at attention while he made the following declaration: "All your postulates are accepted, and we are prepared to initial the protocol. H.M. the Emperor however makes the following condition: The agreement will stipulate that there exists henceforth an offensive and defensive alliance between Germany and France in colonial issues. This clause is to be discussed and agreed to this very day."

The French experts had to make it clear that the proposed addition went beyond the latitude of their instructions, and that a more anodyne formula must be found. It was eventually agreed to substitute a clause to the effect that Germany and France undertook to respect and require respect for the Act of Berlin. This was in fact only to reaffirm the validity of an existing instrument. Colonel Monteil regards this incident as evidence of the constant antagonism to Great Britain which he believes to have been throughout a dominating influence with the German Emperor. But it is doubtful whether so early in his reign as the beginning of 1894 the antagonism which revealed itself later had yet become chronic, and whether this particular manifestation was not rather due to one of those ephemeral moods which the publication soon afterwards of our treaty with the Congo Free State was destined to exacerbate.

More than six months before his visit to Berlin—it was in May 1893, and the date is important—Monteil had been taken by M. Delcassé, the Under-Secretary of State for the Colonies, to see President Carnot. He had then only recently returned from his remarkable journey from St. Louis to Tripoli, which had occupied two years, and he had pleaded his physical exhaustion

as a reason for declining for the moment to undertake any further expeditions in Africa. But the President's insistance was too strong for him. M. Carnot opened the conversation with these words: "The project before us arises out of the present situation of the Egyptian Sudan, which is *res nullius* in the diplomatic sense of the words." He went on to say that advantage must be taken of that situation to give the French establishments on the Upper Ubangi an outlet on the Nile through the Bahr-el-Ghazal. The point selected was Fashoda, and the direction of the Mission which was to proceed there was offered to Monteil. To the latter's inquiry whether exploration or occupation was contemplated, the President replied, "Fashoda must be occupied." Monteil was appointed Governor of the Upper Ubangi, but for reasons of military expediency preferred the title of commandant. His preparations were completed by October, but his departure was delayed to enable him to undertake the negotiations at Berlin.

Now this assertion that the Egyptian Sudan was *res nullius*, a contention which Monteil, and after him Liotard and Marchand, no doubt accepted in all good faith, is somewhat surprising coming from such a quarter, inasmuch as, quite independently of the attitude of Great Britain, it had been the French Government which up to a certain date upheld the title of the Sultan and the Khedive to the Sudan against all their rivals in Africa.

Only in the previous year, 1892, M. Hanotaux had made the sovereignty of the Sultan and the right of the Khedive his pretext for declining to entertain a proposal from the Congo Free State for a division of the Bahr-el-Ghazal. Again in 1894, when the latter concluded a Treaty with Great Britain under which the Free State obtained a lease of the Lado enclave, a territory within the British sphere of influence defined by the Anglo-German agreement of 1890, notwithstanding the inclusion of a clause in the Treaty specifically reserving the rights of the Sultan and the Khedive, France protested against that instrument on the grounds that these rights were infringed by its terms. Colonel Monteil, on the other hand, represents the French objection to the Treaty as based on the principle that the Free State could not extend its area beyond the conventional Basin of the Congo defined by the Berlin Act of 1885. Once more, as late as 1896, when the British advance up the Nile towards Dongola was initiated, M. Hanotaux instructed the French Ambassador at Constantinople to urge the Porte to inquire into the motive of that expedition and to ask why the Sultan had not been consulted.

Nevertheless, insistent as the French Minister for Foreign Affairs had always been in maintaining the rights of Egypt against other powers, when the legitimacy of the actual occupation of Fashoda by Marchand in 1898 was under discussion between the British and French Governments, the latter seems to have reverted to the *res nullius* argument, inasmuch as the Ambassador in London was instructed to contend that we were going rather far in vindicating on behalf of Egypt the privilege of maintaining in perpetuity rights over territories which had once belonged to her. M. de Courcel added that the Egyptian occupation of the Bahr-el-Ghazal had only lasted three or four years, and that this was not much on which to base a claim to inalienable possession. It is true that M. Delcassé was then at the French Foreign Office, and whereas it had been M. Hanotaux who championed the claims of Egypt, he had himself apparently been consistent in recording them as having lapsed. But both ministers spoke in the name of the French Government, and his predecessor had made his plea good against Great Britain and against the Congo State.

After the latter had come to terms with the Government of the Republic in 1894 the provisions of the Anglo-Congolese Treaty were rendered negative, and the moment seemed opportune for a direct understanding between Great Britain and France on various African issues. We made it a preliminary condition to any discussions that Colonel Monteil's expedition should be recalled, and this was accepted by M. Hanotaux. How far Monteil himself was aware of the reasons for this measure does not seem clear, since he confines himself to saying that the column of the Upper Ubangi was recalled on August 2. He assumed however that its recall did not imply the abandonment of any idea of penetration towards the Nile, and indeed, while our preliminary condition was fulfilled in the letter it was certainly not carried out in the spirit, inasmuch as the forces at the disposal of M. Liotard, who remained in charge there, were augmented, and that zealous agent continued to advance in the Bahr-el-Ghazal. The result was the famous declaration of Sir E. Grey in the House of Commons in March 1895. Marchand himself did not actually start on his adventurous journey until after the advance up the Nile had begun in March 1896. Further arguments which might be urged in support of the British case in this important issue do not arise out of Colonel Monteil's book. He advances, however, two other contentions which in the interests of historical accuracy should not pass unchallenged. The first is interesting as an illustration of the French deductive method of reasoning, which starts with a general principle not necessarily supported by established premises and then makes all subsequent conclusions fit in with the hypothesis. On page 117 he affirms that the loss of the Sudan by Egypt was a direct blow to Great Britain which attempted, unsuccessfully at the time, to retake the provinces that had fallen under Mahdist influence, sending for that purpose the force commanded by Hicks Pasha and the abortive expedition of Lord Wolseley. Now it is, or should be, matter of common knowledge that Hicks Pasha was dispatched with wholly inadequate resources by the Egyptian Government in opposition to the advice of the British authorities, who had not yet assumed the dominant position in Egypt which they secured by the Granville doctrine, while the Nile campaign of Lord Wolseley had no other objective but the relief and rescue of General Gordon, who had been sent to Khartoum with definite instructions to complete the evacuation of the Sudan.

Colonel Monteil further assumes that, having met with these insuccesses, Great Britain modified her policy and contemplated the recovery of the Sudan on her own account. With this end in view it became necessary to induce the Khedive to renounce the Equatorial Province, which alone had remained faithful to his rule under the Government of Emin Pasha. In order to accomplish this design a humanitarian expedition on a grand scale for the rescue of Emin was organized and placed under the leadership of Stanley. With the removal of Emin the Sudan was thereafter liberated from any *nexus* with Egypt. The subsequent activities of Lugard, Gerald Portal, Colville, and Macdonald did not however avail to carry British influence any further towards the north, and the co-operation of the Congo Free State had therefore to be enlisted in an endeavour to bar an advance of the French towards the Nile.

Those who witnessed or assisted in the slow and reluctant process of the establishment of British influence in Equatorial Africa will read such a passage with amazement. They will ask themselves whether it is possible for any one seriously to believe that the much-advertised and privately financed adventure of a famous African explorer for the relief of an amiable German man of science, who had no desire to be rescued, was really a deep-laid intrigue of

the British Government. They will remember that the mission of Sir Gerald Portal had for its object to report whether Uganda, which the British East Africa Company had abandoned, should or should not be retained, and they will not have forgotten the difficulties encountered in persuading the legislature to provide funds for its administration. And yet there can be no doubt that the exposition of Colonel Monteil, illuminating as a revelation of how our rivals regarded developments which were certainly not the effects of the causes to which they attributed them, is written in perfect good faith.

The second assumption is that the Marchand expedition, which on August 25, 1898 repulsed an attack on Fashoda by two Dervish steamers, thereby made an important contribution to Lord Kitchener's victory at Khartoum on September 2. What, he asks, was the position of the Mahdi, which should of course be the Khalifa, at the moment when news arrived of the repulse of his steamers, which, owing to defects in the machinery, had been unable to return to Khartoum? "He has sent south an important contingent, and probably the best of his troops, because he has no knowledge of the advance of the English coming from the north. The remnant of the expedition has not had time to return to Omdurman, which is therefore deprived of a large number of its defenders and perhaps of the stoutest of these." The Khalifa, he argues, was furthermore depressed by the knowledge that his empire was simultaneously menaced by two converging forces, one coming from the north and the other from the south.

No one would desire to minimize the credit due to the valiant garrison of Fashoda for their repulse of the Dervish attack on August 25. But no one in possession of all the facts would venture to maintain that the defensive power of the Khalifa, who in the battle of Omdurman lost over 10,000 in killed, in addition to 16,000 wounded and 4000 prisoners, had been gravely diminished by the absence on the fatal day of the complement of two small river steamers. The presumption that the Khalifa had no knowledge of the British advance from the north is in apparent contradiction with the subsequent opinion that he was depressed by the convergence of two hostile expeditions, and it is in any case untenable after the long series of actions which marked the progressive advance up the Nile. It is moreover well known that the Khalifa had resisted the pressure of his counsellors to march against the invading army, claiming to have received a divine revelation that the final overthrow of the enemy was to take place on the threshold of his capital.

While it is the obvious duty of the reviewer of a book of such importance as that of Colonel Monteil to draw attention to these misapprehensions, it is at the same time a pleasure to testify to the spirit in which these reminiscences have been recorded. All who read his volume will heartily endorse the encomium of Captain Hilliard Atteridge, quoted from the *Journal of the Royal United Service Institution* in the concluding chapter, on the admirable work of those soldier explorers who established the bases of the French Colonial Empire in Africa.

RENNELL RODD.

THE WESTERN FRONTIER OF THE SUDAN

Mission de Délimitation de l'Afrique Equatoriale Française et du Soudan Anglo-Egyptien. Exposé des Travaux par le Lieutenant-Colonel Grossard, Chef de la Mission. Préface du Général Mangin. Paris: Librarie Emile Larose. 10 × 6, pp. 343. *With* 10 *Maps.*

THE frontier between the Sudan and French Equatorial Africa was demarcated by a joint commission in 1921–3. This frontier lies in the most remote part of Africa, along that strip in the centre of the continent which is more than 1000 miles from the coast. This is not quite the same thing as saying that it is the most inaccessible region, although it can lay good claims to this title also. In addition to being the most distant and perhaps the most inaccessible frontier, it is also one of the longest. Its length, from the most northerly point dealt with by the Commission, to that point, almost on the parallel 5° N., at which the Sudan, French Equatorial Africa, and the Belgian Congo join, is over 1400 miles. It stretches from the completely waterless desert country of the north, through hundreds of miles of scrub and bush, to the tropical forests of the Nile–Congo watershed. It has an additional claim on the attention of geographers in that, until recently, very little was known about this truly central region of Africa; what we do know is, in fact, largely due to the labours of the above-mentioned Commission.

In April 1924 Capt. P. K. Boulnois gave the Society an admirable account of the work of the Commission; and his lecture, with a sketch-map, was printed in the *Geographical Journal* for June 1924. From the nature of the case, it is impossible to crowd into an evening discourse more than an outline of the work done, and a summary account of the countries traversed. But we heard enough to make us desire to know more, and we can welcome very heartily Lieut.-Colonel Grossard's volume which has just been published.

Colonel Grossard's book has more than twenty times the bulk of Capt. Boulnois's lecture, and contains, in addition to technical reports, general geographical information of considerable value. This is quite typical of French and English practice. Thus, in the case of the 900-mile Anglo-French, Niger–Chad delimitation of 1906–08, English geographers had to be content with the account of a lecture delivered before this Society; whilst, on the French side, Colonel Tilho published remarkably full volumes of descriptions of the boundary zone, including its topography, geology, meteorology, ethnology, and so on. Would any British publishers undertake what French publishers do in these cases; and, if prepared to publish such volumes, would they be allowed to do so by the Government? At present to obtain reliable and complete information with regard to these boundary regions, British geographers must consult foreign publications.

Colonel Grossard's book opens with a Preface by General Mangin, who describes very clearly the diplomatic and military history of the frontier, beginning with the foundation of the International Association of the Congo, then the British occupation of Egypt in 1882, the General Act of the Berlin Conference of 1885, the fall of Khartoum in the same year, the French penetration of Northern Africa from the west, Marchand's expedition and the battle of Omdurman in 1898, the London Declaration of 1899, the French occupation of Wadai in 1910, the defeat of Ali Dinar by a British expedition in 1917, and the Supplementary Convention, signed by Mr. Balfour and M. Pichon in September 1919. The two governments were now, more or less, in contact along the frontier, and the time was favourable for its delimitation. No questions of principle were in dispute.

The French Mission, of which Colonel Grossard was the chief, consisted originally of seven officers and eight sous-officiers. The British Mission, commanded by the late Colonel H. D. Pearson, who died during the progress of the work, consisted originally of five British officers, four non-commissioned officers, and some Sudanese assistants. Colonels Pearson and Grossard held a preliminary conference at Paris in August 1921, and adopted the French view that the whole frontier should be marked out, and not a portion only as had been suggested by the British authorities. The French Mission left France in September. The two missions were to meet and begin work at a point on the frontier to the west of El Fasher.

This central region of Africa can be approached either from the east or the west. Colonel Grossard gives four possible routes: up the Congo and Mobangi by Brazzaville and Bangui; by Lagos and Fort Lamy; by Lagos, Kano, and Mao; or, finally, by Port Sudan, Khartoum, and El Fasher. The last was chosen, partly because it was quicker, and partly because it assured both parties meeting at the agreed time. But in returning home the French Mission went by the western route, *vid* Bangui and Brazzaville.

The Mission reached El Fasher on 18 November 1921. This place is described as situated on a wadi running north and south, across which a rocky barrage has had the effect of holding up the water in the rainy season, forming a lake several kilometres long. On the western side the Sudanese authorities occupy the former headquarters of Ali Dinar. It is said that it is a pleasant and unusual sight in that part of Africa to see the trees of El Fasher, spared, according to native report, by Ali Dinar's orders; he threatened to cut off a human head for every branch which might fall, "et, comme chacun savait qu'il n'était pas homme à menacer en vain," not a branch was cut down during the time of his rule. After some vexatious delays, due to the then somewhat unsettled state of the country, the two parties met near the frontier, at Tumtuma, early in January 1922, and work was begun.

The boundary-line, according to the Convention of 1919, runs as follows: From the point where the Sudan, French Equatorial Africa, and the Belgian Congo meet, near lat. 5° N., long. 27° 25′ E., it follows the Nile–Congo water-parting to its intersection with the parallel 11° N.; thence it follows certain generally agreed tribal boundaries, separating Darfur from Wadai as far north as the Wadi Howa, in about lat. 15° 45′; then along that wadi to the meridian 24° E.; and then along that meridian to its intersection with the parallel of 19° 30′ N. So that most of the known ways of cutting up a continent were used: a watershed, a series of tribal boundaries, a river-line, and a meridian.

Colonel Grossard describes simply the characteristic difficulties met with, one of the greatest being want of water in parts of the line. To add to his troubles, he learnt, just as he was beginning work, that funds for his mission had not been voted; so that, in order to economize, he was obliged to send back three sous-officiers. In a rapid journey to the north he discovered that the nearest line of wells was many miles to the westward of the 24th meridian. As regards work further south, he had but little information about the frontier region between the parallels 11° and 7° N., but it was clear that there was no track along the water-parting or near it. Then there was the ever-present difficulty of transport. In the 400-mile march from Tumtuma to Birao (about lat. 10°) many of the baggage animals had died, and the rest were fit for nothing. Most of his riding horses and mules died before reaching Ramela.

On Christmas Day 1922, at Ramela, where Colonel Grossard's party

met several members of the British Mission, he received a messenger from Médecin-Major Gaudiche, stating that Colonel Pearson had been at Birao some days before; that as his state of health appeared serious, the doctor had accompanied him to Um Dafog (Am Dofok); that there he had become worse, and that the doctor thought there was little hope of saving him. The next day another letter arrived, giving news of the death of Colonel Pearson and of his burial at Um Dafog. Colonel Grossard writes "La perte d'un officier aussi distingué fut vivement ressentie non seulement par les membres de la mission britannique, mais aussi par ceux de la mission française qui, en maintes circonstances, avaient pu apprécier ses qualités exceptionelles."

Pearson's companion on that melancholy journey to Um Dafog, Doctor Gaudiche, himself died a few months later near Zemongo. The doctor's death was not only a blow to the Commission, but it was also a loss to science. It was known that he had made anthropometric measurements and notes during his journeys, but it was not found possible to make use of them.

Mr. Boyce was appointed British Commissioner in succession to Colonel Pearson.

The book contains much interesting technical information. Whenever possible the French Mission used plane-tables for fixing the topography, the plane-table surveys being based upon properly fixed trigonometrical points. The fundamental latitude, longitude, and height were derived from a trigonometrical chain carried from Khartoum across Kordofan and Darfar by the Sudan Survey Department. The mean height of the central portion of the frontier was found to be about 3000 feet above sea-level. It was rightly decided only to use route sketches where it was absolutely impossible to do anything else. The *géodèses* were provided with two prismatic astrolabes and two wireless receiving sets, for astronomical fixings when necessary.

And here we may note a complete difference between French and British practice. On a British expedition in Africa the white officers will undertake astronomical, trigonometrical, or topographical work indifferently, leaving, it is true, some of the plane-tabling and traverse work to non-commissioned officers. But with a French mission of this kind the officers are rigidly divided into *géodèses* and *topographes*. Of course the *géodèses* are not geodesists in our sense of the word; in fact, geodesy has not the same signification as with us. This distinction in nomenclature and practice often crops up, notably in international discussions in the Unions of Geography and of Geodesy and Geophysics.

The scale of the mapping in the field was 1 : 100,000, and the contours were drawn at 25-metre intervals. The author remarks that though the geographical work of the two missions was executed independently, as had been agreed, they exchanged their information whenever it was likely to be useful to do so. The agreement of results was, from the practical point of view, quite satisfactory. A check is to be found in the comparison of the values of the terminal points of the independent chains of triangulation. These differences amounted to a few seconds of arc, not sufficient to affect the topography seriously, but sufficient to make it necessary to class the triangulation work as "topographical." The astronomical results usually agreed within a second or so of arc. Colonel Grossard shows that the differences found between the geodetic and astronomical results at Bahai (15° 32′ N.), Kulbus (14° 21′ N.), and Iffené (12° 48′ N.), varied up to 7″ in latitude and 14″ (of arc) in longitude, differences in which local attraction is no doubt mixed up. He is also able to compare Colonel Tilho's determinations at Aga and elsewhere with his own;

but there is no certainty as to the exact positions occupied. He sums up that, when one compares the results obtained by astronomical methods with those obtained by geodesy (triangulation), from the point of view of the number of stations calculated, their situation, and the accuracy of their positions, it is seen that geodesy is always preferable when the country is suitable. Sound advice, which needs taking to heart in these days of wireless!

The most adventurous part of the expedition was the reconnaissance along the meridian 24° E. As Capt. Boulnois has told us, along the British side there are no wells north of Sendia, which is a little south of 16° N. On the French side there are a few scattered wells at distances of 30–50 miles to the westward of that meridian, the most northerly reached by Colonel Grossard being at Weiba, which is 140 kilometers (87 miles) in a straight line from the 19° 30′ N., 24° E. point, which is the northern end of the boundary. Just as Capt. Boulnois was able to make a rapid dash of 80 miles along the meridian without a drop of water, so Commandant Carrier did actually succeed in reaching the most northerly point. Commandant Carrier travelled along the foot of the cliffs of Weiba until he reached the meridian; then, leaving his water-barrels, he climbed the cliffs accompanied by his servant and a tirailleur, and marching day and night for 63 miles, guided by compass and pole-star, he reached the northerly point at 11 a.m. on 9 August 1922, having left his water depôt on the 7th. He built a cairn, returned the same day, and got back to the foot of the cliffs at 10 a.m. on the 11th. A fine achievement! The British party felt no hesitation in accepting the results of Commandant Carrier's reconnaissance; north of 17° the detail on the protocol map is taken from his work. On the other hand, the French party accepted all the British wireless fixings and topography for the southernmost 250 miles of the frontier.

But one must not leave the impression that this book is simply a record of travel and geographical exploration. We have detailed descriptions of the geology of the frontier region, of its meteorology and magnetism, its fauna and flora, of its hydrography, communications, and methods of transport, with historical and ethnographical notes and vocabularies. It is a mine of information about this little-known region. Colonel Grossard is to be congratulated on this substantial contribution to our knowledge of the geography of Africa.

C. F. CLOSE.

THE MEDITERRANEAN LANDS

The Mediterranean Lands: an Introductory Study in Human and Historical Geography. Marion I. Newbigin, D.Sc. London: Christophers. 1924. 7½ × 5, pp. 217. *With Sketch-maps.* 5*s.* 6*d.*

WHILE the modern teaching of history tends to lay greater stress on the relations between human groups and their geographical surroundings, it is not surprising that geographical teachers have found it necessary to treat the regional part of their subject as an introduction to the same problem of the relation of the environment to its human exploiters. And fortunately this trend has not been confined to the teaching of modern history: the traditionally "classical" curriculum has accepted (rather then embraced at all cheerfully) the same broadening of outlook. But while the pioneer text-book for our home region, Sir Halford Mackinder's 'Britain and the British Seas," has been followed by quite a number of useful supplements, there has not till now been any similar manual for the Mediterranean region. Even in the series which

opened with Mackinder's volume, this lacuna remains, though Dr. Hogarth's 'Near East' naturally touches the subject at many points. For readers of German—rarer now than ever in secondary schools and none too common among University students—Philippson's 'Das Mittelmeergebiet' is a model of well-arranged information, but it is briefest on the side most useful in the kind of teaching already mentioned; and this is probably one reason why that excellent introduction to the Mediterranean world has never been translated into English.

Now comes Miss Newbigin's book, planned to supply this particular need; "an attempt to show what is meant by human geography, and at the same time to trace the development of Western civilization in relation to geographical conditions." It presumes in the "upper forms of schools" a "background of elementary knowledge" which ought to be, but is not always, realized; and on the other hand provides for "University students in the earlier stages of their course" perhaps rather more of the outlines of ancient history than might be safely pre-supposed in most of those who are likely to use the book at all. To attempt all this in a volume of a little over two hundred pages is a bold venture: a problem essentially of selection and exposition. The result is rather an essay than a handbook, with something of the more informal, tentative treatment appropriate to a course of lectures. There are almost inevitably repetitions, as well as digressions and changes of scale; for the human history of the region has been a long one, and the same fundamental problems of its utilization have been attacked from different sides. That is indeed the peculiar interest of the Mediterranean Lands; for they have a continuous and really eventful history longer than that of any other region of similar extent, and are now in at least their third—some would say even in a fourth—cycle of civilization; so that comparative study in the strict sense begins to be possible here, as it is possible almost nowhere else. Egypt alone can offer anything similar; and Egypt, as Miss Newbigin realizes, is itself a special case of Mediterranean exploitation, at all events so far as its "Lower" *régime* is concerned.

The contents of such a book as this naturally fall into two main divisions, which Miss Newbigin calls the "Geography of Mediterranean Lands" and the "Historical Sequence." The former discusses the more permanent factors of structure, physical and biological environment, and fundamental "human response" in the way of elementary breadwinning and interchange of commodities; the latter illustrates the main historical phases of man's activity under these limiting conditions. The geographical section is that in which the limits of space are most severely felt; for it has been necessary to reduce to occasional phrases the pre-human history of Mediterranean conditions, which is so closely continuous with the human development. The result is occasionally a misinterpretation, as when on p. 32 it is said that "westwards the Ionian Sea is as it were a crude and imperfect copy of the Ægean." Structurally, at least, it is not; and its structure is as different as it is because as long as there has been either an Ægean or an Ionian Sea at all, they have been subject to quite different forces; and this dissimilarity persists into the period of Greek colonization, and beyond it. For the same reason the old-fashioned terminology of "indentation" (for example) of coastline, "island-sprinkled" Ægean, "submarine banks run out," "the Mediterranean ends blindly," recurs here and there. The chapter on the "Human Response" is rather fuller, and is one of the best sections of the book. Particularly fresh and useful is the discussion of the fundamentals of Mediterranean economy, corn, wine, and oil: thoughtful "boot-leggers" will find comfort in the paragraphs about the

vine (p. 61), "a kind of organic pump which brings water from the subsoil to within man's reach."

In the "Historical Sequence" which follows, the opening section on the "Marginal Lands" is very properly brief and mainly geographical: in the bibliography reference might have been expected to the standard work of Breasted on Egypt and of Olmsted on Assyria, both easily accessible, and the latter well supplied with geographical matter. "Sea Trade" deals only with Phœnicia, the Minoans being reserved for the chapter on "Athens and the Greek City State," which rather perverts the perspective. It has never been safe to say much about Phœnicia: least of all just now, when we have got rid of the Turk and are beginning to know something; and it is a relief to find here a Phœnicia without history before about 1600 B.C. and to have the Punic settlements in the west transferred to the chapter on that region. There should however be reference to some English monograph of later date than Rawlinson's 'History of Phœnicia': the best are the articles in the *Encyclopædia Britannica* and *Enc. Biblica*. The functional analogies between the Phœnicians and the Jews might have been elaborated, and account taken of the coalescence between Jewish and Phœnician survivors in the Roman period, though this seems to be in the writer's mind in another context on p. 122. The account of the Greek colonization which follows is rather sketchy and conventional, and hardly does justice to the many-headedness of this enterprise. In what sense is it true that "Sparta sent a colony to Cyrenaica"? If this were known, it would go far to clear up some problems of current archæology, perhaps even of history. There might also have been more discussion of the motherland outside Attica, and reference to the masterly interpretation of Greek social conditions in Zimmern's 'Greek Commonwealth.'

It was a wise arrangement to treat the earlier activities of Rome as part of a general survey of the Western basin, in which Carthage and Etruria find proportionate place. But is it true that "Greek colonists could not maintain themselves on Italian soil as against the Roman advance"? Politically they ceased to be independent, but they had never formed a political whole as the Punic settlements did under Carthaginian leadership; whilst Rome's eventual utilization of Greek cities further east followed lines already traced in Roman acceptance of the city states of South Italy as her *socii navales*.

Then comes an odd omission. Between the "rise" and the "decline" of Rome we should have expected, if not some account of the landward consequences of Alexander's conquest of the Mediterranean dependencies of Persia, at all events some sketch of that redistribution of Hellenism into which Roman enterprises spread at the beginning of the second century B.C. It has to be admitted that in most of the classical curricula of this country Polybius and Livy are apocryphal books, a *terra incognita;* but we look to a geographer to put us right here, even at the cost of including a chapter which mere "Greats men" will skip. The statement that "the [Roman] mode of advance by land was everywhere the same—great roads were constructed, with stations at regular fixed intervals, and colonies were planted in the lands as they were conquered" (p. 155)—hardly applies at all, east of the Adriatic, until the age of Augustus, and then only in non-Mediterranean Europe; and in connection with the discussion of the corn-supply which follows immediately, this account of the *normal* Roman procedure might easily mislead. Between Freeman's 'Sicily' and Graham's 'Roman Africa,' room might have been found for Mommsen's 'Provinces,' which has at all events been translated, if not for some reference to the works of Cagnat, Gsell, and Jullian. Another odd

omission concerns the transference of imperial administration from Rome to Constantinople : on pp. 168–171, covering the period in question, no personality is mentioned except Diocletian, Theodoric, and Justinian, and then on p. 179 "the Eastern or Byzantine Empire was centred at Constantinople" without reason given why this should be so.

Almost inevitably, in this and later chapters the proportion of historical matter to geographical rises, and there is the less need to comment on them in detail. Enough has been said to indicate what may be expected from Miss Newbigin's essay, and what should not. It is in any case a book from which students, and also a good many teachers, will get many valuable suggestions which they may develop for themselves. J. L. M.

REVIEWS

EUROPE

Travel in England in the Seventeenth Century.— Joan Parkes. Oxford University Press. 1925. 9 × 6, pp. xvi. + 354. *Illustrations.* 21*s. net.*

MISS PARKES has compiled a very entertaining and instructive book. She has drawn her matter very widely from the literature of the century. Pepys and Evelyn, Camden and Dugdale, one would expect to meet, but it is also a delight to make the acquaintance of John Taylor, the Water Poet, and especially of Mrs. Celia Fiennes, who travelled some 3000 miles on horseback through the country. The author's plan has been to provide a copious supply of material, and then to allow the reader to form his own picture. Apart from the lighter subjects, lighter at least to us, if not less trying to contemporaries, such as highwaymen, inns and alehouses, and the other trials and tribulations of the traveller, there is a very clear account of the condition of the roads and the various attempts at improvement. The seventeenth century witnessed the introduction of the rate for road maintenance, the turnpike, and the stage coach, and the reorganization of the "Post for the Packets." Having quoted a remark of Mrs. Fiennes, "Epshum shall be clutter'd with company from Satturday to Tuesday," the author concludes her book with the adage "There is nothing new under the sun." This receives abundant illustration throughout. There is the attempt to get the iron workers of the Weald to contribute to the upkeep of the roads, on the ground that their heavy waggons particularly damaged them ; there is the familiar tale of London fogs and "stops" in the Strand, and notices in the news-sheets on the state of the roads. The decay of the Thames as a route for passengers, largely through the reputation of the watermen, is also topical, in view of the proposals for the restoration of that traffic. Having read Miss Parkes' book, one can understand the reluctance of the Englishman to travel at home ; had she added as a pendant some account of the circumstances of the "Grand Tour" abroad, one might perhaps have understood what Mrs. Fiennes calls the Englishman's "evil Itch of overvalueing foreign parts." Certainly both seem to have been attended with much danger. G. R. C.

Fossil Man in Spain.— Hugo Obermaier. New Haven : Yale University Press ; London : Humphrey Milford. 1924. 9½ × 6, pp. xxviii. + 496. *Sketch-maps and Illustrations.* 23*s. net.*

Professor Hugo Obermaier, of the Madrid University, published in 1916 a work entitled 'El Hombre Fósil,' which at once attracted attention on account of its author's well-known archæological researches in Spain. Since that date

prehistoric investigation has been active in the Iberian Peninsula, especially in regard to Palæolithic art. Desiring to bring out an English translation of Professor Obermaier's work, the Hispanic Society of America was fortunate in obtaining the whole-hearted support of its author, with the result that this book, 'Fossil Man in Spain,' is a much enlarged new edition brought up to 1922 by his own additions and alterations.

'El Hombre Fósil' was one of a trio of books published about the same time on Early Man. It was significant and interesting from the standpoint of anthropology that three such important works as Sir A. Keith's 'Antiquity of Man,' Professor Boule's 'Hommes Fossiles,' and Professor Obermaier's 'El Hombre Fósil' should appear almost together. It showed the growing interest in anthropological science, and that they supplied a want is evident from the fact that they have all passed into a second edition. Whilst the term "Fossil Man" is strictly applicable, from the mode of treatment of the subject, to the works of Keith and Boule—one an anatomist, the other a palæontologist—it is less so to the work under review written by an archæologist. Apart from the Gibraltar skull, the skeletal remains of Palæolithic man yet discovered in Spain are singularly meagre and unimportant, and only 45 out of 372 pages are actually devoted to this aspect of the subject. The archæological evidence of his presence there is however quite abundant, and it is to this that Professor Obermaier more especially devotes attention. He gives a full and detailed account of the Palæolithic sites, industries, and art of Spain, and his discussion thereon is of the greatest value and interest from the light it throws on the distribution, culture, and migration of the earliest known inhabitants of that country.

Undoubtedly the peculiar importance and interest of this book is due to the detailed account of Palæolithic art in Spain, in the investigation of which the author has taken a leading part. The wonderful mural art in the caves of the Cantabrian region of North-West Spain has been made known to the scientific world through the splendidly illustrated monographs rendered possible by the munificence of the Prince of Monaco. In the present work the less known examples found in other parts of Spain, especially in the south-east and east, are fully described and well illustrated. The paintings in this part of the country are found chiefly on rock shelters, not in caves as in the Cantabrian region, and they are of the greatest interest inasmuch as they supply what is wanting in the mural art of South-West France and North-West Spain, namely, representations of the human body. Here we see the primitive hunters depicted to the life, in every imaginable attitude, with their personal adornments, and, armed with bows and arrows, engaged in the chase and war. Representations of female figures give us some idea of the dress worn by the women in these remote times. Whilst the art of the Cantabrian caves is an extension of the Aurignacian and Solutro-Magdalenian cultures of South-West France, that of South-East and East Spain was the product of Capsian culture, the name given to the prehistoric phase of Northern Africa, corresponding to the Aurignacian of France. From his study of the industrial culture, Professor Obermaier is of opinion that not only the Capsian, but the Chellean Acheulean industries reached Spain from the south, that is from Northern Africa; but that the Mousterian, as well as the Solutro-Magdalenian, came from the north. The importance of the Iberian Peninsula therefore lies in the fact that it was a highway and connecting link between two continents. Here was the meeting-place of two streams of culture, one from the south, the other from the north, where they intermingled and underwent a further evolution.

Space does not permit reference to the many other important questions discussed by the author, but notice must not be omitted of the very valuable Appendix (of more than eighty pages) consisting of notes and a detailed bibliography for each chapter. It will be invaluable to the student and to the investigator. E. A. P.

Gone Abroad: A Story of Travel, chiefly in Italy and the Balearic Isles.— Douglas Goldring. London: Chapman & Hall, Ltd. 1925. 9 × 5½, pp. 254. *Illustrations.* 12*s.* 6*d. net.*

Mr. Goldring is an adept at blending fact and fancy. The greater part of his book is of the stuff common to most travel books, but he refuses to be bound by convention for long. After a discussion of the details of travel, accommodation, or scenery, never humourless or without significance, he will break off without warning to analyse without malice a typical English character, or to make an onslaught upon a school of novelists. His own attractiveness lies in his ability to conjure up an atmosphere with the least effort: as in his account of the wet day at Molina di Ledro, with the disconsolate, aimless wandering from inn to inn. Then, tiring perhaps of the insipid firmament of the south, he darts away to Middlesbrough, to pen a devastating indictment of that city's exterior, concluding with the most handsome of compliments to its citizens. He will succeed, no doubt to his own real regret, in popularizing these resorts of Mallorca and Liguria: of those who follow in his tracks, however, it will be a fortunate and a deserving man who succeeds in extracting as much delight from his visit as the author has done.

In Broken Water: Being the Adventures of a Six-Tonner through Holland and among the Frisian and Danish Islands.— K. Adlard Coles. London: Seeley, Service & Co., Ltd. 1925. 9 × 5½, pp. 182. *Illustrations and Sketch-maps.* 8*s.* 6*d. net.*

This first book on a first yachting cruise is well written and entertaining. In leaving Dover for the Hook, the crew, mostly inexperienced, took a certain amount of risk, but they came through safely, and doubtless now consider themselves old hands at the game. There is a pleasing absence of technicalities in this narrative, and equally pleasing evidence of a sense of humour, and a keen interest in persons and places visited. "No; the cruise abroad appeals for adventure and variety: but for pleasure and scenery—Home Waters."

New Governments of Central Europe.— Malbone W. Graham, assisted by **Robert C. Binkley.** London: Sir Isaac Pitman & Sons, Ltd. 1925. 8½ × 5½, pp. x. + 683. 21*s. net.*

This comprehensive work treats of the constitutions and recent political history of the succession states of the German and Austro-Hungarian Empires. In each case the preceding constitutions are also sketched, so that the influence of new principles upon old forms can be traced out. Charts are given to demonstrate graphically the quarters from which the various governments have drawn their supporters. A useful feature is the collection of original documents in English, of about 250 pages, upon which the main text is really a commentary.

Geographischer Führer durch Nordtirol.— Dr. Johann Sölch. Berlin: Borntraeger. 1924. 6 × 4, pp. xii. + 258. *Sketch-map and Diagrams.* 6*s.* 6*d.*

This small volume, written by the Professor of Geography at the University of Innsbruck, forms the first of a series of geographical guides to be issued by

the publisher. It is not quite a guide-book in the ordinary sense, but aims at giving the traveller with geographical tastes indications as to what to look for during his excursions. The author, not unnaturally, regards Tirol as a unit which has now been forcibly divided. North Tirol he defines as the Inn valley from Finstermünz to Kufstein, together with the Inn tributaries, and the upper portions of the valleys of the Lech, Loisach and Isar so far as the boundary passes. He divides his book into two parts, the first giving a summary account of the geography of the area, and the second describing geographical excursions to the chief places of interest. Present conditions have made it impossible to insert more than a somewhat rough sketch-map and a few diagrams, but very full references are given both to the literature of the subject and to the available maps. The book will scarcely replace Baedeker for the ordinary tourist, but it will form a useful supplement.

As an indication of the nature of the contents we may note that in the section on climate emphasis is laid upon the effect of the Brenner saddle in permitting the foehn, especially in spring and autumn, to reach Innsbruck. In consequence the mean annual temperature here is higher than in other places in the Inn valley. This again affects the flora, which shows a definite mingling of southern forms. As regards crop plants it is noted that maize is first mentioned in Tirol in 1626, the potato in 1766. The Romans introduced fruit-trees and the vine, but the last has now practically disappeared from North Tirol. M. I. N.

The Blue Guides.— Edited by **Findlay Muirhead. Northern Italy: from the Alps to Rome.— L. V. Bertarelli.** Pp. cxii. + 486. 15*s. net.* **Brittany.— F. Muirhead** and **M. Monmarché.** Pp. xxxii. + 152. 7*s.* 6*d. net.* **Normandy.— F. Muirhead** and **M. Monmarché.** Pp. xxviii. + 129. 7*s.* 6*d. net.* London: Macmillan & Co., Ltd. 1924–25. 6½ × 4. *Maps and Plans.*

Mont Blanc.— Roger Tissot. With a Preface by **G. W. Young.** London: Medici Society. 1924. 8 × 6½, pp. 142. *Illustrations and Sketch-map.* 7*s.* 6*d. net.*

Lago di Garda.— Helena L. Waters. London: Methuen & Co., Ltd. 1925. 7 × 4½, pp. xv. + 162. *Illustrations and Sketch-maps.* 6*s. net.*

Rome (The Little Guides).— **C. W. Ellaby.** With 33 Illustrations by **B. C. Boulter.** London: Methuen & Co., Ltd. 2nd ed. 1924. 6 × 4, pp. xii. + 291. *Illustrations and Map.* 5*s. net.*

Through the Chilterns to the Fens.— Gordon Home. London: J. M. Dent & Sons, Ltd. 1925. 7 × 4½, pp. x. + 180. *Photographs and Drawings.* 2*s.* 6*d. net.*

These volumes form a fairly comprehensive selection of the various kinds of guide-books at present pouring forth. The three in the Blue Guides Series follow the plan already noticed in the *Journal*. Their aim is severely practical. Not only should they make it impossible for a visitor to miss, or at least be unaware of, the sights to be seen in the areas covered, but, wherever he may happen to find himself, he will always be able to calculate the cost of a night's lodging, or the railway fare to any other spot, however remote. M. Tissot's book, on the other hand, gives no plans of towns or "practical information." He is described in the Preface as "a man of action, with the temperament of a poet," and "a cultivated and enterprising companion, rather than a guide." He keeps his readers, consequently, well informed of the literary and artistic associations of the scenes, admirably portrayed by the Medici Society.

The remaining volumes occupy an intermediate position. Miss Waters'

'Lago di Garda' is an artlessly written little guide, describing, with much miscellaneous historical information, the country roughly within the triangle Bergamo–Trento–Verona. It is interspersed rather infrequently with incidents of travel. Mr. Ellaby's book was originally published in 1904: in the present edition have been incorporated the general results of archæological research in the interval. His subject-matter is the monuments of Rome, which are conveniently treated in several chronological sections. The sketches are attractive, as are those in Mr. Home's handy volume. The latter might almost have entitled his volume 'Through Whig England,' for he begins with Milton and the Russells and leads the way through Cambridge and the Fens to Cromwell. It is also attractive in that it describes a part of England which has practically escaped the changes of the Industrial Revolution, a fact that is no doubt connected with its political colour.

ASIA

With Lawrence in Arabia.— **Lowell Thomas.** 4th edition. London: Hutchinson. [1925.] $9\frac{1}{2} \times 6$, pp. xiii. + 317. *Illustrations.* 21*s. net.*

Mr. Lowell Thomas crossed the Atlantic in 1917 as a Publicity Agent. Behind him, we believe, stood a syndicate of American gentlemen interested in spreading knowledge of the War in the United States, and, no doubt, with other interests in the venture. He presented himself to our War Office with an introduction from the State Department in Washington, and the authorities, rather at a loss what to do, eventually passed on the puzzle to Cairo, recommending him in non-committal fashion to the General Staff and to the Arab Bureau. He wanted to go everywhere and see everything; and a good deal of trouble was taken to ensure his not going everywhere—least of all to certain Arabian places. But when Allenby had occupied South Palestine, Mr. Thomas found a field. He had with him, in Mr. Chase, an expert photographer; and he knew, as War Correspondents of illustrated papers know, that vanity opens to portrait artists doors closed to other non-combatants. In Jerusalem came his first chance—he happened upon Lawrence on the latter's way back from a flying visit at G.H.Q. to the Arab front, then south of the Dead Sea. Soon afterwards, in Cairo, came a second. Feisal sent down a message, asking that more publicity be accorded to his campaign, and that some one be commissioned to see his front. So up, after all, went Mr. Thomas with his photographer into the fringe of Arabia, and, as is described in this book, he saw Lawrence again, this time somewhat nearer the Desert, was given an escort to Petra, snapshotted all that he could in a few days, and returned. That was, we believe, all that he saw of Arabia, or of Lawrence in the field. The title of his book may give a different impression; but in the body of it the author makes no claim personally to have followed his hero's footsteps. They trod too near to the God of the Arabs for that. From that moment—perhaps from an earlier one—Mr. Thomas knew on what to focus his limelight. The great public cares for personalities, not places or policies, and hungers after a single hero. The War has been singularly unfertile of meteoric figures. But here was one of which much could be made, and before and after the Armistice Mr. Thomas worked away to fashion a popular idol. He first exhibited the creation in his "Travelogue" in London and up and down through the world. Subsequently he learned a good deal more, partly from companions of his Prophet, partly from stray writings (*e.g.* articles on the train-wrecking adventures), perhaps partly also (we cannot help suspecting) from Lawrence's own 'Seven Pillars,' copies of whose first complete recension have fallen into a good many hands these three last years. Now it all appears

in a book, about pushing which on the public the author has been, to do him justice, in no indecent hurry. Lawrence and others might easily have forestalled him. The knowledge which it shows of the main incidents of the Arab revolt, and, indeed, of the policy of Lawrence and others in promoting and guiding that revolt, is surprising, under the circumstances. It is always imperfect, often confused, still more often chronologically inexact; but the chief events are all there—somewhere—if frequently contaminated one with another, ascribed to the wrong causes, and very partially told.

It is not possible here to correct, item by item, the misstatements and misunderstandings of a book which reads more like a compendium of cinema "captions" than anything literary, and is indeed desperately hard, for one with independent knowledge of its material, to read closely. It abounds in the purely mythical—honest repetitions of rumour—about Lawrence's family relationships and early life; about his being a "Prince of Mecca" and (a quaint fancy!) "Honorary Descendant of the Prophet" (!); about the scope of his pre-war ranging among Arabs and his linguistic attainments; and so forth and so forth. But only one or two corrections of particular statements, that may do immediate harm, are worth making now, seeing that the full story will shortly be published by the only man who knows the whole of it. When Lawrence stayed on in Arabia in the autumn of 1916, he was not (as implied in Mr. Thomas's book) breaking his military leave. He had been transferred temporarily from the General Staff to the staff of the High Commissioner and so to the control of the Foreign Office, as soon as he first landed at Jiddah. Mr. Thomas, of course, could not know this. The unification of the western and northern Arab tribes was mainly the work of Arabs, and the general Blood Truce that solely of Feisal. Mr. Thomas shows knowledge more than once that Lawrence did not act as a military commander-in-chief, or ever lead the Arab armies; yet, inconsistently, he fills the book with dithyrambic phrases which imply the contrary. Lawrence drives but rarely will lead.

This book will give the public a general idea (inadequate but founded on considerable knowledge of ill-known facts) of the sort of thing that went forward in the Arab campaigns of 1916 to 1918. Nothing previously published has told so much. But, if any clear picture of the chief actor emerges, it is a Lawrence of cinema. A plain story of those years would leave this book out of sight, not merely by its historical truth, but by its romantic interest. But that story passed too far outside Mr. Thomas's knowledge for him to attempt it. What he is able to tell evidently fills a felt want, for his book is already in a fourth edition. D. G. H.

In the Land of the Laughing Buddha: The Adventures of an American Barbarian in China.— Upton Close. New York and London: G. P. Putnam's Sons. 1924. 9 × 6, pp. xxiii. + 356. *Illustrations.* 17*s.* 6*d. net.*

Mr. Josef Washington Hall, to give the author of this book his real name, is an American journalist who has spent eight years in China, living amongst the Chinese, speaking their language, and taking part in their recent political upheavals. The book is the result of his adventures and experiences. It was while he was interesting himself in the Shantung question that he acquired his pen-name. In the hope of influencing American opinion in the saving of Shantung for China, he secretly sent some articles, "the first on-the-ground record of the Japanese penetration to reach the outside world," to the editor of the Shanghai *Weekly Review*, adding the words "Up Close" as an indication of where he was. They were run as the author's name under the title,

evolved into "Upton Close," and the name stuck. Mr. Hall has several very interesting chapters on the Famine Relief work with which he became associated, but as a whole his book is likely to be somewhat irritating to the serious student of China in her period of transition. He writes with zest, often with humour, and the personal experiences he describes reveal the true spirit of adventure; but one could have wished that less space had been devoted to personal matter, racily written though it is, and more to Mr. Hall's reasoned opinions, based as they would have been on careful observation on the spot. He is perhaps too afraid of being serious, but that he is capable of forming sound judgments may be seen from his pronouncement that the geographical representation and party oligarchy of Anglo-Saxon democracy are hopelessly out of harmony with the instincts of the Chinese people, and can exist there only temporarily and artificially.

The book is admirably produced and well illustrated, though the source of the pictures, except of those taken by the author, is not usually acknowledged, while it is to be regretted that an index and a sketch-map showing Mr. Hall's journeys were not included. O. R.

Guide to China (revised edition).— Tokyo: Japanese Government Railways. 1924. *Folding Map in pocket, numerous Maps and Plans in text.*

This revised edition of the 'Guide to China' is the fourth volume of the official series of guide-books of Eastern Asia issued by the Japanese Government Railways. The series is a remarkable illustration of the enterprise and activity of Japan in this part of the world. It is hardly too much to say that for Eastern Asia it serves the purpose which the Baedeker Guides perform for the countries of Europe, and this is a considerable achievement if we remember the difficulties in the way of obtaining accurate information in many parts of the Far East, and more particularly in the interior of China.

The guide is built up on the Baedeker plan. Introductory chapters giving much valuable information to travellers are followed by a series of well-planned sections on the land and its people, on the outlines of its history, on social institutions and customs, literature and language, trade and industry, and a very concise and illuminating study of the history of arts in China. The remainder of the book consists of 429 pages of compressed but thoroughly readable topographical description arranged in relation to twenty-six selected routes which cover practically all the parts of China accessible to the ordinary traveller. Accompanying these descriptions are a number of artistic hachured regional maps and plans of the principal cities, while a pocket in the back cover of the volume contains a good general map of China on the scale of 1/3,600,000, showing in detail railways, canals, roads, and steamship routes.

In the introductory sections a somewhat fuller and more systematic account of the physical geography would have been acceptable, and the paragraphs on the climate contain some errors. It is certainly incorrect to speak of the south-west monsoon blowing from April to October for China as a whole. The direction of the summer monsoonal winds varies considerably in different parts of the country, but on the average they blow much more nearly from the south-east than from the south-west. The figure given for the mean annual rainfall of Shanghai (30 inches) is much too low. According to meteorological statistics, based on observations extending over many years, it is as high as 44 inches. It may be noticed in relation to the climatic *régime* that the visitor is advised to spend the autumn in North China, the late autumn and early winter in Middle China, and the late winter and early spring in the south.

Chapter iv. on "The Land and People," seems unduly brief and incom-

plete when compared with the sections on other topics. It contains one error which may offend the susceptibilities of Chinese readers. Manchuria is still classed with Mongolia as distinct from China Proper, which is described as comprising eighteen provinces, whereas the Chinese lay stress on the point that since 1907 Manchuria, which was then organized into three more provinces, has been an essential part of China Proper. Chinese Turkestan was also constituted a province as far back as 1878 under the name of Sinkiang, or "The New Dominion." Officially, therefore, "China Proper" now consists of twenty-two instead of eighteen provinces.

The chapters dealing with such matters as social institutions and education are in the main fair and sympathetic, and include references to recent phases of development such as the modern school system, which, notwithstanding the political troubles, is making considerable progress. Similarly in the descriptive part of the Guide attention is often called to progressive movements. In the description of Tai-yuan-fu, for example, a special tribute is paid to the admirable work of General Hsi-shan, "the Model Governour," under whose enlightened *régime* Shansi has become one of the most prosperous provinces in China.

The descriptions are concise and well proportioned. They do equal justice to scenes of natural beauty, to places of historic interest, and to agriculture and industry. The arrangement is good and the directions to travellers are singularly clear. The description, for instance, of the famous West Lake at Hangchow is a masterpiece of orderly, concise, and interesting information.

When China "settles down" and offers greater security and convenience to the thousands of Western visitors who would like to experience for themselves the subtle charm of this ancient land and its wonderful civilization, the "Guide" will be an indispensable part of their equipment. P. M. R.

AFRICA

Petroleum in Uganda.— E. J. Wayland. Geological Survey of Uganda, Memoir No. 1. Entebbe, 1925. 13 × 8½, pp. 61. *Four Maps and Twenty-two other Illustrations.*

The Geological Survey of Uganda is to be congratulated on the exceptional interest of its first memoir, which, though devoted mainly to occurrences of petroleum of still unproved value, makes some valuable contributions to the geography of the Albert Nyanza basin. The seepages of oil there have been attributed to two sources—the older rocks, and the lake deposits on the floor of the valley. After a full discussion of the available evidence, Mr. Wayland supports the latter view. There is no proof of any supply in commercial quantities, and the author is very guarded in his opinions as to the probability of a productive oilfield. He points out that the question can only be settled by boring, and he has collected all the available superficial evidence as to the best position for a trial. An oilfield in the area would be exceptionally useful. In describing the general geology of the area around the oil seepages, the author describes the Kaiso beds, which have yielded some fossil bones; that described by the late Dr. Andrews, a Chalicotheroid, is of exceptional interest. These bone beds appear to be of Pliocene age, and their fauna is at present under description. The author also describes the position of the two series of stone implements which have been found in Uganda. The older series are of Mousterian type, and it is interesting to note that they are regarded as contemporary with the extension of the East African glaciers, just as the Mousterian in Britain has been correlated with the glaciation connected with the upper part of the Chalky Boulder Clay. The Palæolithic implements of post-

Mousterian type have been found in some later deposits which Mr. Wayland correlates with the recession of the Ruwenzori glaciers. Fuller accounts of these implement beds and of the general geology are to be issued later. The memoir also discusses the structure of part of the Albert Nyanza basin. The memoir is conclusive that it was formed as a rift-valley by the down-faulting of its floor. There has been some discussion as to whether the faulting was due to compression or to the tearing of the country asunder by tension. In contradiction to the original suggestion that the rift-valley was due to tension, the claim has been put forward that the fractures were due to compression, and were reversed instead of normal faults. Mr. Wayland's memoir remarks that no unquestionable reversed faults have ever been seen along the rift valley, and the only faults directly observable "are normal collapse faults due to accommodation of the valley side to subsiding rift-blocks." The existence of reverse faults is therefore now limited to hypothetical deep-seated faults, and all those actually observable are normal faults and are due to tension. The memoir is illustrated by some beautiful photographs by Mr. Combe, and four instructive maps showing specially areas of oil seepages. The description of the fossils from the Kaiso bone beds will be awaited with interest.

J. W. G.

Nigerian Days.— A. C. G. Hastings. With an introduction by R. B. Cunninghame-Graham. London: John Lane. 1925. $8\frac{1}{2} \times 5\frac{1}{2}$, pp. xxiii. + 255. *Illustrations and Map.* 12*s.* 6*d. net.*

It has long been a recognized principle of African administration that to win the confidence of the native each district must remain for long periods in control of the same officers. Unfortunately, the exigencies of the service, especially in West Africa, make this sort of continuity very difficult to obtain. Mr. Hastings, however, is an extreme case, for he never served two consecutive tours in the same place. Consequently, during his eighteen years as a political officer in Nigeria he gained a very wide and varied experience of the country and its people. He became intimately associated with most of the Fulani emirs, and had considerable dealings with truculent pagans. His book is most agreeably written, and is the best account of a political officer's life in Nigeria that has yet been published, but it is very little more. Those who are acquainted with Mr. Hastings will regret that he has not attempted something more ambitious. If his book is not as informative as one could wish, or as he could well have made it, it is not the less pleasant reading, and will appeal to a wider public.

Mr. Hastings went to Nigeria in 1906, when the British were new arrivals in the country. Those strenuous early days have often been described, but Mr. Hastings' account of them is full of interest and humour. His chapters dealing with native administration and his own work form the most valuable part of the book. Like other political officers of equal experience, he has unshaken confidence in the wisdom of indirect rule, the method of administration first conceived by Sir Frederick Lugard, which has recently been the subject of much ill-informed criticism in the English Press.

The hazardous nature of political work in pagan districts is well illustrated by Mr. Hastings' account of his dealings with the Tulas and Awoks. He writes with all modesty, but his readers will not fail to appreciate the courage and resource with which he handled difficult situations.

'Nigerian Days' may safely be recommended to the general reader, and should be read by all who contemplate joining the Colonial political service. From it they will derive much entertainment and an appreciation of some of

the difficulties of colonial administration, than which there are few more interesting professions. The book is well illustrated with photographs, but the absence of a good map is to be deplored. The single sketch-map included in the book is of so little value that it might well have been omitted. E. W. B.

Livingstone : Fifty Years after.— Henry Walton. London : Hutchinson & Co. 1925. 7 × 4½, pp. 188. *Illustrated.* 2*s. net.*

Notes from the diary of a member of the Livingstone Film Expedition, which contain descriptions of the state of the country and peoples associated with his life-work, and incidents of present-day travelling in South and East Africa. The book is interesting, but rather slight, and reveals no secrets of the art of the film producer.

The River of the Giraffe.— Frank Savile. London : H. F. & G. Witherby. 1925. 9 × 5½, pp. 218. *Sketch-map and Illustrations.* 15*s. net.*

Human beings seem to be divided into those who are by instinct hunters, and those who are not. The two classes have little common ground, for the latter find it difficult to appreciate the pleasures of the former in killing different kinds of animals for motives unconnected with self-defence or the supply of food. The author of this book is a hunter ; his work is therefore not likely to appeal to those who are not. It has little geographical value : indeed, it is not meant to have. The writing is light and sometimes facetious, but one is very grateful for the omission of jejune anthropological excursions and essays on political topics with which so many of these books are interlarded. The perfunctory sketch-map at the beginning has a misprint in the spelling of Taufikiya, omits the important locality of Renk to which the text is constantly referring, and displays in large letters the name " Congo Free State " which has long since ceased to exist. But there are many pleasing passages in the letterpress, especially the one (pp. 106–109) describing the fall of dusk on the river. They stamp the author as one of the lucky people who appreciate the beauty of those small things which the majority do not notice. F. R.

Pygmies and Bushmen of the Kalahari.— S. S. Dornan. London : Seeley, Service & Co., Ltd. 1925. 9 × 5½, pp. 318. *Map and Illustrations.* 21*s. net.*

Like some other insignificant peoples, such as the Andamanese and the Semang, the Bushmen of South Africa have claims to attention which are not to be measured by their importance in the world's affairs. Except for their persecutors, white and black, it is, however, chiefly the ethnologist who has shown an interest in them, since they have never been dangerous enough to attract the politician.

Mr. Dornan has done good service in bringing together the results of his years of study of the Bushmen and other peoples of the Kalahari. In the sense in which he uses the word—which varies in its extension with different writers—the Kalahari desert forms the greater part of the Bechuanaland Protectorate, and lies between the upper Molopo river and Lake Ngami on the north, and between Palapye on the east and Reitfontein on the west, with a total area of not less than 140,000 square miles. Mr. Dornan gives an interesting account of the nature of the country, with its variety of rock, soil, and sand, its salt-pans and ranges of sand-dunes, and its abortive rivers. A brief survey of the animal and plant life is given, and the general unhealthiness of the climate is emphasized.

The author discusses briefly the evidences of the life of prehistoric man in the Kalahari, but in this he is clearly on rather unfamiliar ground, and his

suggestion that Rhodesian man may be one of the ancestors of the Bushman does not carry any weight. The present inhabitants are the Bushmen (commonly called the Masarwa), a few Hottentots, the Bakalahari, and the Bechuana. Mr. Dornan gives an account of these and some other peoples (Namaqua, Korana, Griqua, and Damara), but the Bushmen receive by far the largest share of attention. Much of the information is in agreement with what has long been known of the Cape Bushmen, but the author's account of the Masarwa is of great value as a first-hand record of the life of a vanishing people. He discusses their origin and history, their social organization and family life, their language, their folk-lore and religion, their material culture, and other aspects of their daily life. The illustrations are good, and altogether the author may be congratulated on a book which should be read by all ethnologists, and which is of considerable interest to the geographer.

H. S. H.

AMERICA

Work and Play in Argentina.— Capt. J. Macnie. London: T. Werner Laurie. [1925.] 9 × 6, pp. viii. + 188. *Illustration.* 10*s.* 6*d. net.*

This is the autobiography of a young Irishman who went out to try his luck in the Argentine "camp" (as all non-urban areas are styled), and who had the fortune—after hard work and strenuous play in the open which suggests his title—to gain the enviable position of the present-day Argentine landowner, that is, not only with a handsome income from his property, but an added yearly increment, which must be the envy of the harassed estate owner in the Mother country.

The Venado Tuerto district, where the author finally settled down in the late 'eighties, soon passed from "outside camp" to "inside camp." The semi-pioneer life gave place to the ordered march of the up-to-date stock station, for which Argentina probably sets the highest standard in the world. Most of the book deals with this formative period, which may of course still be met in the newer Argentine settlements, but much further away from the capital, in the Chaco, Patagonia, and elsewhere. We read of good-natured horseplay at the race meetings, of polo gatherings, of the building up of the new stations, and of the ups and downs of sheep and cattle farming, the "downs" finally and happily swept away by the mounting wave of ever higher prices and increased production which carried their owners to prosperity.

This must be one of the few books written in "camp" English. Either through inability to find the proper equivalents, or in order better to preserve the "camp" atmosphere, the author has adopted the style of speech common to many Englishmen in the River Plate, by using the Spanish word, where it is more readily understood by the peons or local residents. The reader is confronted on every other page by such phrases as the following: "If the money which is spent on locust inspectors were devoted to barera, there would be a lot more maize saved, instead of the estanciero or the chacarero providing good cash to be devoured by locust commissions and langosteros."

Life on the estancia is touched upon sympathetically, with stories of the amusing vagaries of many pets of different sorts. There are good descriptions of local beast and bird life, the latter much increasing as new ground is brought under the plough. A dozen snap-shots show the wide gulf which separates up-to-date from out-of-date Venado Tuerto. Very wisely, the author does not try to deal with the wider phases of life in the country of his adoption. There will be many, however, both in Argentina and in the London clubs,

among the old and the younger generation alike, who will share his affectionate regret for a phase of life which is passing rapidly in

> " The camps of Tinamu, where the pasto puna grew
> Till the paja voladora hid the fences from the view."

Good luck to Mr. McNie: he has deserved it. But it is just as well that he has been thoughtful enough to add a glossary of Anglo-Argentine words for the benefit of the uninitiated. W. S. B.

AUSTRALASIA AND PACIFIC ISLANDS

The Threshold of the Pacific: An Account of the Social Organization, Magic and Religion of the People of San Cristoval in the Solomon Islands.— C. E. Fox, Litt.D. With a Preface by **G. Elliott Smith, F.R.S.** London: Kegan Paul, Trench, Trubner & Co., Ltd. 1924. 9½ × 6, pp. xvi. + 379. 14 *Plates*, 39 *Illustrations in the Text, and a Map.* 18*s. net.*

This important work is the first volume to be issued in the Historical Ethnology section of the " History of Civilization " series. The island which Dr. Fox so aptly calls the threshold of the Pacific is San Cristoval, whose inhabitants have preserved many remarkable survivals of a culture for the exact parallel of which, as Professor Elliot Smith points out in his preface, we have to go as far afield as Egypt, and as far back in time as the Pyramid Age, forty-five centuries ago. The inhabitants of San Cristoval—which it is possible to divide into several large districts fairly distinct from each other both in social organization and customs—fall into two main groups: those who are organized into a number of totemistic clans—bird clans to the west, aquatic clans to the east, and both along the coast of the central part; and those who occupy the large central portion of the island, a dual people, without totemism. Dr. Fox has carried out long and patient investigations on the spot into the religious beliefs and folklore of these peoples, and he gives besides a detailed account of customs relating to birth, death, and marriage, describing, among other things, the children's games. medicinal remedies, feasts, and the functions of chiefs.

Particularly interesting is his account of the shark-men and were-sharks of Ulawa and San Cristoval. The belief is that the shark-men and the were-sharks exchange souls—a conception so surprising that Dr. Fox admits that it was long before he understood it. The initiation takes place soon after a boy is born; the father (a shark-man) hugs his son to his chest and then crooks his left arm to represent a shark's fin and carries the child under his arm to the shark-rock, where the boy and his future familiar shark receive the same name; if the child dies the shark will die; if the shark is injured the child will fall sick. The shark-boy regularly sacrifices yams, nuts, money, and betel to his brother, and fasts from bananas and puddings with coconut icing, and from all things that women specially eat or make; nor may he eat eel or frog. " When the shark-man dies," Dr. Fox tells us, " his body is taken to the shark-rock and bathed, and two long lines of lime are drawn from ear to heel; while this is done two similar lines appear upon the were-shark, who also dies."

Professor Elliot Smith mentions that Dr. Rivers was so impressed with Dr. Fox's work in San Cristoval that he declared it to be " one of the most important, if not *the* most important, piece of field-work that has ever been done in social anthropology," and in his book ' Psychology and Politics ' he claimed that " the resemblance between the mortuary customs of ancient Egypt and modern San Cristoval, so close and extending to so many points

of detail, makes it incredible that they should have arisen independently in these two regions."

Anthropologists have indeed cause to be grateful to Dr. Fox for undertaking this work before old customs, of such intense importance, had completely passed; even for him it was, he tells us, "almost too late." It is obvious on every page that Dr. Fox has been animated by the highest ideals of scientific research; he writes with scholarship and praiseworthy reserve, never attempting to generalize or to develop unduly his own theories, but content to set down the facts he has collected and verified with such patient labour. The book is exceptionally well illustrated, and has an excellent index. O. R.

Knocking about: Being some Adventures of Augustus Baker Peirce in Australia. Edited by **Mrs. A. T. Leatherbee.** London: H. Milford. 1924. 9½ × 6, pp. xi. + 176. *Illustrations.* 14*s. net.*

The author, an American, left his ship in Melbourne in 1860, and spent the next thirty years of his life in Australia. As a pilot on the Murray river, a gold prospector, and a travelling artist, he came into contact with many and varied people, including aboriginals and bushrangers.

Western Australia: a History from its Discovery to the Inauguration of the Commonwealth.— J. S. Battye, Litt.D. Oxford: Clarendon Press. 1924. 9 × 6, pp. 480. *Sketch-maps and Illustrations.* 25*s. net.*

Dr. Battye's work on Western Australia is a complete account of the country from its first discovery by European navigators to its inclusion as a State in the Commonwealth of Australia. It is a scholarly book, representing many years of labour, and it provides what has been wanted, a history of the colony based on the original sources. Far apart from the other settlements in the continent, Western Australia in its progress did not keep exact time with them. Founded as a free colony when there were only penal settlements in the east, it became, of its own choice, a penal settlement when the sister colonies became free. To that choice it owed its escape from the economic depression which seemed to have settled upon it in the first two decades of its existence. Dr. Battye contends that no permanent moral injury was inflicted by the convict system on its life, but that none the less its national prosperity was dearly purchased by the taint of a convict period in its history. The grant of responsible government was necessarily delayed; nor did the demand for it become a burning question in the colony for more than thirty years after the other Australian colonies had enjoyed its advantages. It was made in 1890, and almost immediately after followed the great gold discoveries in the colony, the inrush of population and the division of feeling between the goldfields and the coast. Within a few years Western Australia had to choose between isolation and union with the rest of Australia, and, pressed by the mining population, it passed with some reluctance into the Commonwealth. E. A. B.

History of Australian Land Settlement, 1788–1920.— Stephen H. Roberts. London and Melbourne: Macmillan & Co. 1924. 10 × 6½, pp. 20 + 428. *Sketch-maps.* 21*s. net.*

As Professor Ernest Scott writes in the Introduction he has contributed to this able and exhaustive work, land policy is "the fundamental subject in Australian history." In Canada and South Africa the conflict of race, in South Africa and New Zealand the conflict with the indigenous population, disputes with land questions importance of place in the history of the colonies; but in Australia, fortunate in its relatively vacant lands and in the homogeneousness of its settlers, the land question has always been *the* question. How com-

plex and technical it is those know well who have tried to find their way through its mazes, how thrilling with interest only those who can see, beyond the legislator's rules and regulations, the adventurous energies and competing interests which they sought to encourage or control. Mr. Roberts has thus had a big task, for it is really the story of the making of Australia that he has to tell, as he traces through the century this main stream of its history. And he has gone to work with enormous industry and care, as his extensive bibliography and the imposing array of sources on almost every page combine to demonstrate. He divides the history into five periods: the period of experiments from 1788 to 1831, when grants were abolished; the period of Wakefield; the period of squatting, of which he has given a most interesting account, from 1831 to 1855; the emergence of agriculture, from 1855 to 1884, when the farmer rose to predominance; and the period of closer settlement, when new policies held the field. The story is told throughout with a clearness and precision which make Mr. Roberts' work an invaluable guide. It is also told with a breadth of outlook and fullness of knowledge of other aspects of Australia's life which enable him to give a full historical significance to his subject. The many original maps and graphs are a most important feature of the treatment, and a real aid and addition to knowledge; and though the style is not distinguished and the footnotes are superabundant, the book, taken as a whole, is a most valuable contribution to Australian history—a difficult piece of work well done.

E. A. B.

The Journal of William Lockerby, Sandalwood Trader in the Fijian Islands during the Years 1808–1809. With an Introduction and other Papers connected with the earliest European Visitors to the Islands.— Edited by **Sir Everard im Thurn, K.C.M.G., K.B.E., C.B.**, and **Leonard C. Wharton.** London: The Hakluyt Society. 1925. 9 × 6, pp. cxi. + 250. *With 3 Plates, 4 Sketch-maps, and a Chart.*

The Fijian Islands first began to attract the notice of British and American traders in the early years of the nineteenth century, owing to the sandalwood which by accident had been found to grow abundantly on Vanua Levu, then known as Tocen Roba or Sandal Wood Island. Surprisingly little record of these visits has survived, and between the years 1815—by which time the sandalwood had been exhausted—and 1837, when Wesleyan missionaries and European traders gained a footing, the islands were little visited from outside. The publication of this journal is, therefore, of exceptional interest and importance, for it was written in Fiji during the time of the sandalwood trade, and so is the earliest known record of an eye-witness of personal experience in the islands. The manuscript, which had never been published, was first placed in Sir Everard im Thurn's hands by Mr. Leonard C. Wharton, a great-grandson of William Lockerby, in 1915, and it revealed an obviously true story of the first entry in historical times of Western folk into the islands.

William Lockerby arrived at Mbua Bay as mate in the American ship *Jenny* on May 21, 1808. Sandalwood was the object of the visit, and Lockerby was successful in establishing friendly relations with the Mbuan chief. Towards the end of July, when a full cargo had been completed, there was a quarrel between the mate and his captain, and shortly afterwards Lockerby and six men of his boat's crew found that the *Jenny* had sailed for China, leaving them alone among the Fijians. For the next nine weeks they lived among the natives, Lockerby himself being allowed the privileges of rank and assisting the chief in defensive preparations against the attacks of his enemies. In October the *Favourite* came into Mbua Bay in search of a cargo of sandalwood. Lockerby

offered his services to the captain, but hostilities had by this time broken out, and eventually he and some of the *Favourite's* men were taken prisoners by the enemy. Then began his most harrowing experiences, but he was rescued in the very face of death, and, his captors having been dispersed, he remained collecting wood in the islands until 2 June 1809, when he left for China in the *General Wellesley*. Besides his gruesome account of the cannibalistic practices of the Fijians and their custom of strangling the wives of chiefs, he gives many intimate details about the social life of the Fijians at this period, and the record is substantiated and amplified by the inclusion of other papers dealing with the early visits of Europeans to the islands; these are Samuel Patterson's narrative of the wreck of the *Eliza* in 1808, the journal of the missionaries put ashore from the *Hibernia* on an islet in the Fiji group in 1809, and Capt. Richard Siddon's account of his experiences in Fiji in 1809–1815.

Sir Everard contributes a thoughtful and scholarly introduction, which shows evidence of deep research and patient labour. As a production the book is an admirable example of what such a work should be: sufficiently, but not unmercifully, annotated, well documented, with a good index and maps. The chart reproduced is from that made by Aaron Arrowsmith in 1814, the first approximately correct chart of a part of the group "constructed from original documents," while the beautiful and carefully drawn illustrations by Miss Gardner King make one wish that it had been possible to include more than three. O. R.

MATHEMATICAL AND PHYSICAL GEOGRAPHY

River Gauging: A Report on Methods and Appliances suitable for Use in Great Britain.— M. A. Hogan, Ph.D., A.M.Inst.C.E. Prepared for the Committee on Gauging Rivers and Tidal Currents: Department of Scientific and Industrial Research. London: Published under the Authority of H.M. Stationery Office. 1925. 10 × 6, pp. viii. + 70. *Illustrations.* 2*s.* 6*d. net.*

This report is supplementary to Dr. Hogan's report on current-meters published in 1922, in so far as it describes the tests, both laboratory and field, carried out in order to decide on the methods and appliances suitable for use on a hydrometric Survey of the United Kingdom.

The portion of the report relating to current meters is admirable throughout, and, though space does not permit of a detailed review, some general conclusions may be considered. The rivers of this country are divided broadly into three classes:

(*a*) Small streams.
(*b*) Large streams and rivers with natural flow.
(*c*) Large streams and rivers artificially regulated.

Class (*c*) is briefly dismissed; the conditions affecting the measurement of discharge vary so much in individual cases, that each case must be considered on its merits as it arises—a sound conclusion.

In Class (*b*) when rivers are of fairly regular section, the discharge is a function of the depth, and the method adopted is to prepare a stage-discharge curve, based on current-meter measurements at different stages. It is evident that the selection of a suitable meter and of reliable methods of rating are all-important factors in this method of measuring discharge, and the greater portion of the report is properly devoted to the consideration of these factors. An important part of this section is the discussion of the behaviour of current meters under turbulent and oblique flow, and it is suggested that, in cases where turbulence is likely to cause a serious error, duplicate gaugings should be

carried out—one set by means of the Price meter (cup or bucket type) which records in excess in turbulent flow, and the other set by means of a propeller type meter, like the Stoppani, which records in defect under the same conditions. The difference between the two results would give an indication of the turbulence effect.

An interesting section describes experiments devised to test the Wade principle of meters driven by a constant external force, the latest design of which records velocities down to one centimetre per second. The need for meters to record velocities less than 0·5 foot per second is felt in special cases only, and as the small Price meter is reliable down to this limit, it is approved as generally suitable.

The field measurements with current meters were carried out on the Liffey and on the Severn. On the former, where the flow is free from weed growth, the stage-discharge curve gave good results. On the Severn, at medium and low flows, weeds and rubbish alter the *régime* of the channel and render the curve inapplicable. This alteration in *régime* is typical of many rivers in this country, and the problem of measuring their discharge awaits solution: the author suggests that the Buckley-Wilson recorder may supply it. In this recorder the cams which control the recording mechanism are designed on a fixed and pre-determined value of the coefficient of roughness. Any alteration in *régime* sufficient to affect the surface slope would also alter the appropriate value of the coefficient and necessitate a correction of the recorded discharge by means of a percentage-error curve, plotted from actual measurements of discharge by current meter or other method. It would appear that such measurements could equally well be used for plotting a stage-discharge curve applicable to the existing conditions. By using curves appropriate to the *régime* the stage-discharge method would still apply, and, unlike the Buckley-Wilson method, is not open to serious objection on the score of expense.

The last section is devoted to a discussion of weirs suitable for gauging small streams. The author emphasizes the importance of gauging such streams, which are valuable potential sources of power or of domestic supply, and states that "the purpose of the present review is to discuss how the problem may best be tackled." Unfortunately there is little discussion, as the conclusion is almost immediately stated that "the use of some form of weir is probably the most suitable method." Beyond an explanation why current-meters are not suitable, no evidence is given in support of the assertion, though as a discussion of weirs for gauging purposes the section is excellent. Attention is directed to the effect of silt accretion above the weir, which affects the accuracy of the calculated discharge by increasing the velocity of approach and by reducing the crest contraction. This section would be more complete had the method of gauging small streams by rectangular flumes come under consideration. The method is largely used in India.

As a whole, the report is a valuable addition to the literature of the subject.

N. F. M.

The Riddle of the Earth.— "Appian Way." London: Chapman & Hall, Ltd., 1925. 8½ × 5½, pp. xiv. + 252. *Illustrations and Diagrams.* 10*s.* 6*d. net.*

The author, "whose pseudonym covers the identity of a well-known writer," was struck with the bad weather of 1924 and the astounding fact that we do not really know anything about its causes. Where did all the water come from that fell between 26 December 1924 and 3 January 1925? In Rome on about December 26 a great meteor had been observed flashing past the Earth,

estimated to have been as big as the moon. Greenwich Observatory doubted the alleged size of the meteor, but American astronomers took it seriously. The meteor left behind it gases which were attracted into our atmosphere, condensed, and hence the storms. It is surprising that great subjects like volcanoes and earthquakes are allowed to be placed on a shelf. The key to these matters is the volcano, the residue of another world, the deposit of a meteor. Meteors obey an impulse towards the Earth from the direction of the Magnetic Pole. Where lines of volcanoes stretch in any given direction which is at present the direction of the Ecliptic Pole, at one time that part of the Earth was the position of the then North Pole. An active volcano attracts the wandering meteor, and hence is a danger to all in its vicinity. We require a new and untrammelled attitude upon these questions, says "Appian Way" in his Preface.

We thank the author for teaching us that word "untrammelled" to describe his attitude. He quotes Newton when it suits him, yet avers that "the three types of orbit defined by astronomers, namely, the ellipse, parabola and hyperbola, are, on the face of it, entirely opposed to the laws of gravity." He thinks that the very form of a volcanic mountain is sufficient evidence that it was dumped on the Earth from the skies, yet that in the laws of creation the volcano appears to stand for the feminine principle. He believes that a comet's impact formed the glacial drift and at the same time petrified verdant forests into our coal-measures. The coalfields of the North are almost entirely limited to the area smitten by the comet, which brought down upon the Earth also the basalt, and if we understand rightly, the chalk! Finally, "it is the profound conviction of the writer . . . that the City of Bath possesses a long-lost history at once amazing and illustrious, and was a very great city at the time of the Drift."

To call this paradox would be flattery. A. R. H.

GENERAL

The World Missionary Atlas.— Edited by **Haslan P. Beach** and **Charles H. Fahs.** Maps by **John Bartholomew.** London: Edinburgh House Press. 1925. 15 × 10, pp. 250. £2 2s.

This important work, in many senses a truly monumental record of modern Christian effort, has been compiled for the Institute of Social and Religious Research of New York. The excellent maps with which it is illustrated have been prepared by Mr. John Bartholomew, and offer an exhaustive survey of the various activities of the many societies (representing numerous nationalities) engaged in Christian propaganda, both evangelistic, educational, and medical, throughout the world.

It should be mentioned that, in view of the fact that only one map is found allotted to the missionary efforts of the Roman Church, the editors have been unable, through circumstances entirely beyond their control, to do more than briefly touch upon the great field with which those efforts deal.

This remarkable compilation essays to give a conspectus of missionary work somewhat similar to that presented in the work on 'The Christian Occupation of China,' which was reviewed in the *Journal* some two years ago (Vol. 62, p. 46), except that while the latter was sectional in its aims the present volume has a world-wide scope. Quite apart from its strictly evangelistic outlook, this Atlas in itself affords material in many respects for a liberal education in geography. Not only are the locations of the enormous number of mission churches, schools, hospitals, etc., connected with the many societies engaged in spreading the "Protestant" interpretations of the Christian Faith clearly

marked on a series of maps—many with careful insets on a larger scale—but these maps, which cover the five continents and Oceania, are reinforced and explained by some two hundred pages of detailed statistics and directions, in addition to thirty more pages of descriptive notes of considerable interest and explanatory value. An elaborate index, both to the maps and the text, is provided, arranged under four different heads. Interesting incidental reference is made to the way in which—though the old Turkey, generally speaking, was not markedly hostile to religion,—the new *régime* is creating a different tradition and has already raised numerous difficulties which are apparently aimed at putting an end to missionary educational work in the dominions of modern Turkey.

Another reference of considerable importance is found in the clash of effort on the part of Christian and Moslem agencies carrying on their respective propaganda in Nigeria and other parts of West Africa, an area in which Islam is growing greatly. Here whole tribes and even nations which were still pagan when Christian missions first appeared among them have been won for Islam. Probably one of the reasons for this, is that, whilst the Moslem marriage law is easily adaptable to local pagan custom, in many cases Christian monogamy is felt to be too radical and revolutionary a change from ancestral practice to find much favour with the present generation.

To the thoughtful student of geography in its broadest aspects, with a sympathetic eye for the human interest inseparable from a work like the present, it cannot but be clear that the multitudinous contacts of Western civilization with the East are producing in our own day a renaissance comparable with that change which closed the Middle Ages and opened the modern world as we know it. Vast areas of ancient civilization, such as is found in China, India, and the Moslem world, are affected by it, while in Africa tribal life and sanctions are rapidly breaking down under the impact.

Of the manner in which the advocates of the Christian Faith as the most effective means of assisting human progress and development are endeavouring to deal with the problem in its varied and numerous aspects this work will serve to afford some indication. It is worthy of attention as a very practical proof not only of intense earnestness on the part of those who have a wide appreciation of the difficulties to be faced, but also of the best methods of bringing them to a satisfactory solution. W. W.

The British Empire: A Study in Colonial Geography.— Albert Demangeon, translated by **Ernest F. Low.** London: George G. Harrap & Co. 1925. *Sketch-map.* *7s. 6d. net.*

Professor Demangeon has covered a wide field in his interesting book on the British Empire. He excludes the story of colonial conquests, which is the historian's task, and he does not describe the countries of the Empire, for he is not concerned with regional geography. His business is with the nature and results of British colonization—its origins, the types of colony it has produced, the means employed, the spread of British civilization and the economic and political problems of the Empire to-day in India, the Dominions, and the Crown Colonies. On all these matters he has something fresh to say and many penetrating questions to ask. Sometimes he seems to go astray from an inadequate knowledge of English life and of the history of the Empire, but, taken as a whole, the book, with its wise, moderate, and friendly criticism and its considerable insight, will be of great interest to English readers. The translation is admirable. E. A. B.

Rolling Round the World for Fun.— Stanton Hope. London: Hurst & Blackett, Ltd. [1925.] 9 × 6, pp. 324. *Illustrations.* 18*s. net.*

In a comparatively few years Mr. Hope has made an extensive, if unorthodox, acquaintance with the countries around the Pacific: more extensive still is his tale of jobs, which included snow-shovelling in the Rockies, advertisement-drawing in Seattle and Honolulu, and "jackaroo-ing" in the Australian bush. He was also the guest of a Japanese family in Tokio for several weeks. Then the fortunes of war sent him to the Near East. During this life he naturally came across many strange characters and picked up numerous anecdotes, all of which he recalls with relish. However dark the prospect, he never lost heart, so that his book overflows with high spirits, even when he is recounting his most desperate efforts to "live without money."

1. **From Pole to Pole.— L. W. Lyde** and **C. M. Butterworth.** London: Blackie & Son. 1925. 7 × 4½, pp. 144. *Sketch-maps and Illustrations.* 2*s.* 6*d.*
2. **Asia.— J. Thomas.** London: G. Bell & Sons. 1924. 7½ × 5½, pp. viii. + 180. *Sketch-maps and Illustrations.* 2*s.* 6*d.*
3. **Readable Physical Geography.— J. A. O. Muirhead.** London: G. Bell & Sons. 1925. 7½ × 5, pp. viii. + 136. *Sketch-maps and Illustrations.* 2*s.* 4*d.*
4. **Where Geography and History Meet.— W. L. Bunting.** London: T. M. Dent & Sons. 1925. 7 × 5, pp. x. + 112. *Sketch-maps.* 2*s.*
5. **The British Isles.— R. E. Parry.** London: Sir Isaac Pitman & Sons. 1925. 7¾ × 5¼, pp. 252. *Sketch-maps and Illustrations.* 3*s.*
6. **An Economic Geography of Europe.— D. H. Smith.**
7. **The Relations of Geography and History.— H. B. George.** New edition edited by O. J. R. Howarth, with an additional chapter by C. B. Fawcett. Oxford: Clarendon Press. 1924. 7½ × 5, pp. 330. *Two Sketch-maps.* 5*s. net.*
8. **Adventures of Exploration,** Books I., II., and III.— **Sir John Scott Keltie** and **S. C. Gilmour.** London: George Philip & Son. 1925. 7 × 5, pp. 128, 156, 164. 1*s.* 6*d.*, 1*s.* 8*d.*, 1*s.* 10*d.*

1. The small book 'From Pole to Pole' describes the major natural regions of the world. At the end of each chapter there are exercises for the reader to solve, and notes on difficult points mentioned in the descriptions. The book provides an excellent course for children of eleven or twelve years of age who are making their first study of the outlines of world geography.

2. Mr. Thomas's book is one of a series entitled the 'Explorer Geographies.' The preface says that the series aims first at interesting older children in the story of geographical discovery. This book will hardly do this, for it does not sufficiently encourage its readers to read the records of the great explorers themselves. No list of books is given, and only one of the one hundred and seven exercises set for private study directs the pupil to original sources. In the regional part of the book it is rather surprising to find Ceylon included among the "Savannah Lands," while the table on p. 164 gives Peking as belonging to an *East* Coast "Mediterranean Region." The book contains six double-page panorama views.

3. Mr. Muirhead says that his book is primarily intended for the non-specialist teacher, and then goes on to say, "It is the opinion of the author that geography in its elementary stages should, and can, be taught by the form master." Most teachers of geography would assert that the subject-matter

of the 'Readable Physical Geography' should not occupy a separate course below the stage of the first examination. Of course, the non-specialist teacher who uses this book as the basis of a year's work in geography with an elementary class would hardly be expected to know that he was not really teaching geography at all, at least as understood by the recent report of the British Association. When this has been stated it is pleasing to report that the book is accurate and, as its title claims, readable.

4. 'Where Geography and History Meet' is a small book of about one hundred pages which has two main objects: firstly, to show how the study of one subject can help the understanding of another; and secondly, to be suggestive on these two subjects just at a time when the pupil's mind is seriously ready for expansion. The "foreword" is addressed to the Geographers and Historians of the Fourth Form and upwards, and the rest of the book contains, in five chapters, a term's work on the outlines of the relations of the Geography and History of Europe. Mr. Bunting, like many other teachers, has discovered how interested boys can be in such a subject, especially after gaining their freedom from the examination work associated with the study of these subjects taken separately.

5. 'The British Isles,' by Mr. Parry, is Book I. of a new series entitled 'Geography: the Scientific Study of Human Settlement.' The book follows the usual lines of the modern elementary text-book. It is very clearly printed and contains many excellent maps and diagrams as well as a very useful list of books for reference and further study.

6. 'An Economic Geography of Europe' has been written about the standard of the Intermediate Examinations of London University. Mr. Smith says that the book attempts to show how the geographer should correlate the information supplied by the geologist, the meteorologist, and other specialists, and weave it into a connected whole which will throw some light on the relationship of man to his environment. Unfortunately, even if this were the true aim of the geographer, so much ground has to be covered in two hundred and forty pages that most of the space is devoted to recording facts of economic importance, for the author appears to have the requirements of the examination student chiefly at heart. The British Isles, France, and Germany are well treated in some detail, and, in the words of the preface, "no apology is offered for the scanty treatment of other regions or countries." Advanced students of geography will find the more detailed parts of the book very useful.

7. One of the greatest needs of the present-day advanced student of geography is good books on historical geography. There is practically no literature on this important subject. 'The Relations of History and Geography,' by the late Mr. A. B. George, was first published in 1901, and the present edition, the fifth, has been prepared by Mr. O. J. R. Howarth. For the reason stated above, as well as for its own intrinsic merit, the book is very well known, and its suggestive chapters have proved of great help to many. The new edition conserves the views and statements of the original work, and Dr. Fawcett has been responsible for supplementing the original final chapter on America, and for a new chapter on the geographical aspects of the Great War and its aftermath. On the whole, it would have been better to have reprinted the original work as it stood. The added material was not really necessary, for a book of this particular character does not require bringing "up to date" like an ordinary text-book, especially when the work is undertaken by another. What *is* urgently needed is that Mr. George's work should prove a starting-point for others.

8. The three books of 'Adventures of Exploration' are part of a set of six progressive supplementary readers designed to quicken interest in geography by stories of adventurous travel. The first book tells how the continents were discovered; the second tells the main outlines of the story of exploration and adventure in Central and South America; and the third deals with Asia. The first two are printed in larger type than the third, and are more simply treated. Sir John Scott Keltie and Mr. Gilmour are to be congratulated, not only upon undertaking the writing of school books of this character, but upon the way in which they have presented their material to their youthful readers. Boys and girls are intensely interested in geographical discovery and exploration, and they would be far better occupied in reading supplementary readers of this kind than in plodding through the heavy and uninspiring compilations commonly designated "Geographical Readers." Very wisely the books contain accounts of modern adventures as well as the classic voyages of discovery. Book II. tells of Edward Fitzgerald, Col. Roosevelt, and Sir Ernest Shackleton (voyage of the *Endurance*), as well as Cortes, Pizarro, and Raleigh. Book III. closes with a splendid account of the attempts to climb Mount Everest. The series should prove very valuable in primary and preparatory schools.

L. B.

The Nations of the Modern World. Vol. II. After 1914.— Sir Halford Mackinder, M.A. London: Geo. Philip & Son. 1924. $7\frac{1}{2} \times 5\frac{1}{2}$, pp. xvi. + 286. *Maps and Illustrations.* 3*s.* 6*d.*

What now forms vol. I of this book was first written in 1911, and deals, in its geographical setting, with the Napoleonic War, its antecedents and results. In the last edition that volume was brought down to the outbreak of the Great War. The present volume deals, in similar fashion, with the latter war and with its main results, so far as they are at present manifest. It thus falls naturally into two parts, of which the first, and longer, gives a concise but vivid account of the main events of the war, singularly dispassionate in tone. The geographical setting is brought out in Sir Halford's usual picturesque style, the accounts of, *e.g.*, the Pinsk Marshes and the Masurian Lake region and of their respective effects upon the progress of events being admirable. Doubtless because of lack of space the geographical conditions on the Italian front are dismissed in a much more summary fashion, though their interest is not less great.

The second and shorter section of the book is entitled "Some Notes on Political Geography after the Great War," and is full of suggestiveness. As one would expect, there is a striking chapter on the Rhine Frontier, regarded now as a line stretching from the Baltic, along the river, to the Adriatic and then continued to the Taurus, and thus dividing the oceanic states to the west, south, and south-east from the purely continental states to the east and north-east. Much more speculative is the final chapter, "The Great Deserts and the Air," in which Sir Halford compares the internal-combustion engine and wireless telegraphy with the discoveries and inventions which four centuries ago made the ocean "the white man's highway" instead of "the impassable moat of his European prison." He believes that by means of aircraft "the great deserts will be overpassed by the come and go of daily traffic," and geographical factors will thus undergo a new and vast change of significance. In particular he anticipates that the northern ice will cease to be an effective barrier between Northern Europe and Western America on the one side and Eastern Asia on the other. In this connection the twofold error contained in the

statement that "in 1907 the American *Greely* drove his ice sledges to the Pole" should be noted for the next edition.

There are some excellent sketch-maps as well as some interesting war pictures, and the book is both easy to read and, as the quotations indicate, most attractively written. M. I. N,

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THE MONTHLY RECORD

THE SOCIETY

Generous Gift to the Society's Library.

As mentioned by the President in his Annual Address, a generous gift to the Society's Library has been made by Mr. A. P. H. Hotz, C.B.E., a Fellow of long standing who is known for various publications relating to early Dutch intercourse with Persia and the Persian Gulf. He was formerly a member of the Dutch Consular Service in the East, and as Consul-General at Beirut during the War took charge of British interests in that part of the world. For many years he has been an assiduous collector of geographical and historical literature of the Middle East, especially Persia, where he resided for some years, and his Library is probably unique in its completeness, both for rare early works, only obtainable now with great difficulty, and for more modern works with any bearing on Persian history, religion, and literature, as well as geography. Last year he made the Society the generous offer to present to its Library any of his books of which copies were not already in its possession and which might be thought appropriate to a collection concerned with geography in its widest sense. The offer was gratefully accepted, and as the result of a visit to Lugano by Mr. Crone, a selection of several hundred volumes has been made, which have since been safely received and are now in course of arrangement.

Whilst all are welcome as filling gaps even in the more recent literature, the group of early travels to Persia and the East generally is of special interest and value, and many of the volumes might hardly have been attainable otherwise. These include 'Viaggio di M. Cesare de i Fedrici (generally known in English as "Cæsar Frederick") nell' India Orientale et oltra l'India' (Venice, 1587); 'Relaciones de Pedro Teixeira . . . de los Reges de Persia y de Harmuz, y de un Viage hecho . . . dende la India Oriental hasta Italia por Tierra' (1610); Frei Gaspar de São Bernardino's 'Itinerario da India por Terra ate . . . Portugal' (Lisbon, 1611); Padre Manoel Godinho's 'Relação do Novo Caminho que fez . . . vindo da India para Portugal no anno de 1663' (Lisbon, 1665); and many others, the narratives of missionaries and other ecclesiastics being particularly well represented. A small but important volume is one published at Venice in 1558, which includes not only a narrative of the Embassy of Caterino Zeno to Persia in 1471–3, but the supposed voyages of other members of the Zeno family to the Arctic Regions which have been the subject of so much controversy, and are now thought to be purely imaginary. Of the less numerous travels by Englishmen there is the scarce little volume by John Cartwright of Magdalen College, Oxford, entitled 'The Preacher's Travels to the Confines of the East Indies through Syria, Armenia, etc.' (1611). An exceedingly scarce Dutch work is Pelsaert's 'Ongeluckige Voyagie van 't Schip Batavia nae Oost-Indien' (Amsterdam, 1648), which, though preceded by the issue of 1647, appears to be a word-for-word reprint; but, as is so often the case, the sheet of illustrations is unfortunately missing.

Besides these rarities not hitherto represented in the Library at all (or only by modern reprints), there are other editions of works already to be found there, some of them important as earlier in date, or in the original language in which they were written. Thus the works of Adam Olearius appear in the German originals published at Schleswig, though better known from later translations. Della Valle, Thévenot, Tavernier, Chardin, Nieuhof, etc., are well represented, and there is the 1725 Lisbon edition of Pinto, of which, strange to say, the Society has never possessed a version in the original Portuguese. Another useful group consists of nineteenth-century versions of some of the early Arab and Persian geographers: Ibn Haukal, Ibn Khordadbeh, Kazwini, and others. Altogether, the collection forms a worthy companion to Dr. Robert Brown's Library on Morocco and Col. Feilden's on the Arctic Regions.

ASIA

Sir H. H. Hayden's Journey in Central and South-Eastern Tibet.

A brief account, the first to be published, of the late Sir H. H. Hayden's topographical work in Central and South-Eastern Tibet in 1922, compiled from the verbal narrative of Surveyor Gujjar Singh by Major H. T. Morshead, is contained in the Annual Reports of Parties and Officers, 1921–22, Records of the Survey of India, volume 18. Sir H. H. Hayden undertook the journey at the request of the Tibetan Government to examine the mineral resources of the area; besides the Indian Surveyor Gujjar Singh, therefore, he was accompanied by a Tibetan official who had specialized in mining. They left Lhasa on 4 May 1922, and marched for fourteen days north-west across the Nyen-chen-thang-la Mountains to Shen-tsa Dzong, a distance of 180 miles. A plane-table survey, tied to the peaks in the Nyen-chen-thang-la Mountains fixed by Col. Ryder in 1904, was carried out on the scale $\frac{1}{4}$ inch to 1 mile. During a six-day halt at Shen-tsa, a short base line was measured, and a set of astronomical observations for latitude and azimuth taken. Some triangulation was also carried out. A further ten days' journey to the west brought them to Wom-po, on the northern shore of Tang-ra lake. Having returned to Shen-tsa, they made a short trip along the north-east shore of Kya-ring lake to Chu-sum-di and Kya-tsog. Leaving Shen-tsa finally on June 27, they travelled north-eastwards to the district of Namru, level marshy country on the eastern shore of the Tsozi-ling. Here the party separated, Sir Henry Hayden going on to Lum-po on the southern bank of the Tsa-Khye Tsangpo River, while Gujjar Singh worked eastwards, to rejoin at Zi-ri-mar on July 7. During this period conditions were good for plane-tabling. From Zi-ri-mar they turned south towards Lhasa, coming at Thak once more into sight of the Nyen-chen-thang-la Mountains. An accurate plane-table fixing revealed an accumulated easterly error of some 4·3 miles in the course of nearly two months' work. Having crossed the range by the Largen pass, they experienced bad weather, and could only carry out a rough route traverse, which was subsequently transferred to the plane-table section. They reached Lhasa on July 20. They were then asked to visit the district of Thak Po. Leaving on August 8, they ascended the valley of the Kyi chu for three marches, and then turned southward over the Te-Khar pass to the Tsangpo valley, and ascended the Ri-go-sho from its confluence at Rong Dzong to Lhap-so Dzong, the headquarters of the district. From here they visited the village of Ku-ru-nam, on a small southern tributary of the Tsangpo, the seat of a hand-made paper industry. Turning eastward on August 28, they once more reached Lhasa by the Yatotra pass, the Yalung valley, and the Gong pass. On this expedition bad weather prevented

anything but a route traverse by watch and compass being executed, and checked by latitude observations in four places.

As a result of these journeys 36,000 square miles were mapped on the $\frac{1}{4}$-inch scale; of these only 2000 square miles in the neighbourhood of Lhasa had been mapped by Col. Ryder in 1904, and another 2000 square miles south of the Tsangpo in Tsetang and Thak Po, by Col. Bailey and Major Morshead in 1913 on a $\frac{1}{8}$-inch scale. A map of the area on the scale of 1 : 2 millions is included in the report. Other portions had been visited at different periods by, amongst others, Kishen Singh and Nain Singh, Prince Henry of Orleans, Dutreuil de Rhins, and Mr. and Mrs. Littledale.

AFRICA

New Map of the Belgian Congo.

For the past eighteen years the Société Internationale Forestière et Minière du Congo has sent prospecting missions to the Belgian Congo, and members of these expeditions have brought back quite a large amount of cartographical material of various degrees of reliability, ranging from rough compass traverses and sketches to accurate surveys and astronomically determined positions. These were all carefully stored by the society as they arrived, and a few years ago it was decided to utilize them in the compilation of an entirely new map of the Belgian Congo, on the scale of 1/500,000, which is now being published in sheets as supplements to the *Bulletin de la Société Royale Belge de Géographie*. In this creditable undertaking of the Forminière, by which the Société Internationale Forestière et Minière du Congo is now known, the Service Cartographique du Ministère des Colonies has heartily collaborated, and there is little doubt that the resulting map will be the most complete and detailed of the whole country that has yet appeared. Although many parts are still quite unexplored and unmapped, a large amount of cartographical material now exists, and it is satisfactory to learn that this is being competently dealt with. Col. J. Maury, the Professor of Topography at the École Militaire, who is well known for the excellent geographical work he has done on the Congo, recommended that the map should be drawn on a polyconic projection (using the tables based on Clarke's spheroid of 1866), and this suggestion has been adopted, the central meridian selected being that of 22° E. longitude. M. Maury has also furnished many definitely fixed positions to which various parts of the map have been adjusted. The map is printed in colours: water and water names blue; boundaries, roads, and tracks red; and the rest black. Relief is shown by vertical hachures; but occasionally, in certain parts, an attempt has been made to add contours, which must necessarily be very rough and approximate. According to the index sheet, when complete there will be altogether 41 sheets, each measuring about $18\frac{1}{2} \times 27$ inches. Of these seven are already published, covering the south and central parts of the country between lat. 4° S. and the international boundary. The authorities and material upon which each sheet has been compiled are stated in the letterpress accompanying the sheets in the above-mentioned *Bulletin*.

Captain Delingette's Motor Journey from Algiers to Cape Town.

The first crossing of Africa from north to south by motor has been accomplished by Captain Delingette, a Frenchman. Accompanied by his wife, a mechanic, and an Algerian, he left Oran in November 1924. His car was a 13·9 h.p. six-wheeled Renault. The first part of the journey, across the Sahara, he did with the Gaston Gradis Expedition. Leaving it at Savé, Dahomey, he turned north and then east along the Nigerian border to Kano

His intention was to travel south of Lake Chad to Fort Lamy, but through floods he was forced to return to Kano, and to attempt to get round the northern shores of Lake Chad. Having passed through Zinder, he was faced with a dangerous situation in the desert, as his petrol supply ran out. Luckily, he encountered by chance a motor expedition from Tunis to Lake Chad, which supplied his wants. His route then lay through Fort Lamy, and Miltu in the Belgian Congo, where he found the best roads of the whole journey. Thence he travelled through Bambili and Kilo towards the Great Lakes. Crossing the Semliki river on a raft, he found such impassable roads around Ruwenzori that he was compelled to take the car over Mount Saiga, a peak of 9,000 feet, with a gradient in places described as being as steep as two in three, though this is perhaps not to be taken too literally. He arrived at Nairobi in the beginning of March, and then journeyed down to Dar-es-Salaam. Returning to Dodoma, he set out for the northern end of Lake Nyasa. This was the most difficult part of the route. The stage from Iringa to Livingstone, through water, swamps, and mountains, took two months. At one point they had to send to Dar-es-Salaam for a supply of petrol. The remainder of the journey, by way of Bulawayo, was uneventful, and Cape Town was reached on July 4.

Captain Delingette undertook the journey to show the practicability of long distance motoring in Africa without pre-arranged depôts and petrol supplies. The engine was not overhauled throughout the journey, and one tyre lasted from Algiers to within one day of Cape Town, when it was punctured.

AMERICA

The Population of the Amazon Basin.

The difficult subject of the distribution and movement of the population of the Amazon basin is treated by Mr. W. L. Schurz in the *Geographical Review*, April 1925. The basis is the figures obtained by the Crude Rubber Survey of the U.S. Department of Commerce during 1923–24. The area in which rubber can be obtained is approximately 2 million square miles, while the population of those parts of Brazil, Peru, Ecuador, and Bolivia falling within it is estimated at 1,600,000, an average density of less than 1 per square mile. Of these about half live in the State of Para, and half of these again in the area below Gurupa, including the islands of the delta and the drainage area of the Amazon mouth. The State of Amazonas is very lightly populated, especially in the northern portions of the Upper Rio Negro. Its total population is 363,000; 74,000 dwell in the municipal district of Manáos, and 100,000 in the southern portion of the Upper Amazon basin. In this last area the density is about one to 3 square miles. The Acre territory, lying across the headwaters of the Juruá and Purús, with a population of 92,000, has the comparatively high density of 1·6 per square mile. The population of Matto Grosso within the area is 40,000; and Peru, Bolivia, Ecuador, and Colombia contribute about 350,000. As regards urban population, Pará has 180,000 and Manáos 40,000 inhabitants. The racial composition is a mixture of Portuguese, native Indians, and negroes in varying proportions. The pure Indians are steadily decreasing, through interbreeding or extermination; the white population consists almost entirely of town dwellers and landed proprietors. The chief factors influencing the distribution are the rivers and the demand for rubber. The rivers are almost the sole means of transport and communication, and are also a source of food. During the dry months the settlements on the upper tributaries are, however, completely isolated. The villages are generally built on high ground to avoid floods and mosquitoes.

The quest for rubber produced a steady movement up the southern tributaries, markedly checked by the end of the boom in 1910, and a subsidiary movement of Bolivians and Peruvians down the remoter valleys. By 1914, for example, the Rio Roosevelt had been ascended to 10° 24′ S. One very definite migration was brought about by severe drought in Ceara during 1877–79, which led to thousands of Cearenses ascending the Rios Acre and Juruá, and, directly, to the annexation of the Acre territory by Brazil. This movement has continued despite unfavourable conditions, between eight and ten thousand Cearenses arriving there in 1916. On the whole, however, the fall in the price of rubber in 1910 led to a general exodus from the upper valley to Manáos and Pará. Some minor seasonal fluctuations are also caused by the collection of Brazil nuts. There are few permanently settled areas, the food reservoirs for Manáos and Pará, and the Acre territory, being among the exceptions.

Variations of Sea-level on the Atlantic Coast of the United States.

In the *Geographical Review* for July 1925, Mr. H. A. Marmer discusses the question of sea-level along the Atlantic coast of the United States. He defines sea-level for this purpose as the average level of the sea, "the plane about which the tide oscillates." The figure obtained for a particular point will vary according to the period over which readings are averaged. Daily readings are affected by the meteorological conditions: from a graph showing the height of sea-level at Fort Hamilton from day to day for February 1919, it appears that the changes range from less than one-tenth of a foot to more than a foot and a half. The great variations were associated with violent changes in the weather. A similar figure for June of the same year shows variations of less than one foot, which occurred in spite of practically uniform weather conditions throughout. Monthly heights of sea-level show less marked variations, but the difference between the greatest and least values for any one year is just under 1 foot. The lowest levels occur in the early part of February, the highest in the latter part of August. Figures from other stations on the coast show that the annual variation of sea-level increases from north to south: at Portland it is about a quarter of a foot, at Fernandina exactly a foot. A variation from year to year is also revealed: it generally ranges from less than a tenth to a quarter of a foot. The figure shows a periodic variation with a period of about four years, and then a further one with a nine-year period. During the years 1903–24, the difference between the first and last nine-year periods was just over a tenth of a foot. This analysis shows that reliance should not be placed on observations of sea-level taken over short periods to prove coastal subsidence. At present the observations are not sufficient to draw definite conclusions, but the belief that the Atlantic coast is sinking at the rate of 2 feet a century has been shaken. The main causes of the fluctuation of sea-level are undoubtedly connected with meteorological factors and ocean currents, but the writer suggests that they may also be due to changes in the volume of the ocean basins and waters, through coastal movements, increase or decrease of glaciation, or other similar causes.

The St. Lawrence–Great Lakes Deep Waterway. Power from Niagara.

During the last year some progress has been made in the negotiations between the United States and Canada in the matter of the projected waterway to link the St. Lawrence and the Great Lakes, a proposal first made by the Deep Waterways Association in 1895. The present position of the scheme is discussed by Mr. R. E. Freeman in the *Nineteenth Century* for June. Under the

Washington Treaty of 1909, the United States and Canada agreed to set up an International Joint Commission to deal with the use, obstruction, and diversion of boundary waters. In 1920 the two Governments submitted the question of the St. Lawrence to this body. After full investigation it has reported in favour of the plan, and the question has now to be examined from the respective national points of view by the two National Advisory Committees. There the matter rests at present. Apart from the value and practicability of the scheme itself, it is bound up with the whole question of the use of the water of the Great Lakes. Already the level of the lakes has been perceptibly lowered by American operations, and last year correspondence passed between the two Governments on the considerable diversion of water fron Lake Michigan required by the Chicago sanitary system, and on the proposal to build a canal between Chicago and the Mississippi.

The two physical obstacles to be surmounted in the building of the canal are the Niagara Falls and the rapids of the St. Lawrence. The former will be overcome by the New Welland Canal, 25 miles long with a lift of 366 feet, which is being built by the Canadian Government, and the cost of which the joint committee has recommended should be included in the international scheme. The committee also recommends the total reconstruction of the canal system for passing the rapids which all occur within a stretch of about 43 miles. This is divided into two portions: an international section from Ontario to Cornwall, built on the Canadian side, having two locks with lifts of 48 feet and 31 feet, and a system of dams across the canals to reduce the constructional work required; and secondly, a Canadian section from Cornwall to Montreal, replacing the Soulanges Canal and following the course of the present Lachine Canal. The international section would also be designed for power development. The total expenditure has been calculated at approximately 250 million dollars. If the whole system were utilized for the supply of power, an annual net profit of over a million and a half dollars has been estimated. The support for the scheme comes in the main from the corn-growers of the Middle West and the Prairie Provinces, who look forward to cheaper freights, and less damage and delay in transport, with cheaper imports in return. In the United States, the opposition comes from interests such as the New York Barge Canal, Boston, Buffalo, and the Pacific States, who see in it a potential rival to the Panama Canal. In Canada, some fear, especially in the east, that the main benefits will go to the United States; some of the corn-growers dislike the prospect of lower freights for their southern competitors, and champion the Hudson Bay route. Montreal also fears that it may damage its harbour interests. Then there are many other points to be settled, if, as seems likely, the scheme is eventually executed, such as power rights of Provinces and the Dominion, and the division of the cost.

Another aspect of the question of the development of power is discussed by Mr. S. S. Wyer in 'Niagara Falls: its Power Possibilities and Preservation,' Publication 2820 of the Smithsonian Institution. At present the diversion permitted by the Treaty of 1910 is already being fully utilized, and produces approximately 1·3 million h.p., of which 783,000 h.p. is produced in Canada. From the figures of the American Falls Mr. Wyer has calculated that sufficient water to develop a further 2½ million h.p. could be diverted from the Canadian Falls without spoiling the scenic effects. Indeed, as this would prevent the rapid erosion at present going on, he holds it would actually preserve them; an object which he would further secure by building artificial islands, or a submerged dyke, in the stream, to ensure a more evenly distributed flow. As Ontario largely depends upon the Niagara installations, much additional power could be absorbed.

AUSTRALASIA AND PACIFIC ISLANDS

A Walk round Australia.

We have received from Mr. A. de Brune, of Sydney, a type-written copy of his diary kept during his walk round Australia. Mr. de Brune left Sydney on 20 September 1921, and travelling north-about returned on 4 March 1924. He kept as close as possible to the coast-line, and walked altogether 10,060 miles approximately. During this trip he covered some ground previously little known to Europeans. The diary consists mainly of details of the route followed, and doubtless Mr. de Brune will publish later a full account of his adventurous trip and the impressions he formed during it.

POLAR REGIONS

The Macmillan Arctic Expedition.

The Arctic exploring expedition led by Captain Donald Macmillan reached its base at Etah, Greenland, at the beginning of August. The United States Government have lent three naval amphibians, to carry out long-distance flights. It is proposed to establish an air base at the northern end of Axel Heiberg Land, and then to attempt to examine the area to the north and west. The expedition, if successful, should thus solve the problem of the existence of Crocker Land.

MATHEMATICAL AND PHYSICAL GEOGRAPHY

"Tidal Waves."

The sudden and dangerous swells of the sea-surface, erroneously termed "tidal waves," as a substitute for which, at least in scientific circles, the Japanese word *tsunami* has been suggested, form the subject of an article by Dr. Camille Vallaux in No. 4 (1925) of the recently instituted *Matériaux pour l'Etude des Calamités*, published by the Genevan Geographical Society under the auspices of the International Committee of the Red Cross. The causes of this class of sea disturbance are placed in three main categories: seismic, volcanic, and meteorological. The waves of seismic origin succeed the earth-tremor by varying intervals—by half an hour in the case of a great disturbance on the coast of Peru in 1835. Many earthquakes, however, are not succeeded by such disturbances of the sea, so that coastal populations in stricken zones do not always take to flight unless they first observe the sea to recede. In the case of the great wave which devastated the coasts of Chile and Peru in 1868, there was a preliminary recession of the sea in nineteen localities, but in eighteen others the inhabitants had no such warning. The waves connected with eruptive agency are considered to be less frequent than those connected with earthquakes, though the geographical distribution of the phenomena with a maximum frequency on volcanic coasts like the Pacific, West Indies, and Mediterranean is probably not without significance. On the other hand, although the Central Atlantic is well known as an active zone of submarine eruption, the neighbouring coasts of Africa and South America are free from sea disturbances of the kind in question. Many great volcanic eruptions, moreover, have not been followed by disastrous waves, and it is suggested that the Krakatau wave was due more to the collapse of two-thirds of the island than to the eruption itself. The meteorological tidal waves common in the Bay of Bengal and other tropical regions, though not unknown in temperate seas, occur when certain conditions of pressure and wind coincide with exceptionally high tides. Lastly there is a peculiarly interesting and treacherous

type of "tidal wave," very sudden and brief, probably connected with seismic or eruptive disturbance, which, travelling at great distances from the source of disturbance, gradually subside but become magnified again into dangerous proportions on reaching steeply shelving coasts, such as occur at many points in Brittany and Cornwall. Though not usually doing much damage to shipping, this kind of disturbance, occurring suddenly in calm weather, often takes toll of human life. According to Montessus de Ballore, Cornwall and Brittany are liable to receive swells of this type from the seismic and volcanic centre near the Azores, whereas the Gascony coast is protected by the coast of Spain. The French name of the phenomenon, *lame de fond*, or "bottom surge," is partly indicative of its nature, whilst the English term "tide-rip" is an instance of that expressive local phraseology in relation to natural phenomena that one finds in different parts of England. These "rips" are described as having little in common with the seiche phenomena of lakes.

GENERAL

Early English Charts at Florence.

A small collection of charts lately brought to light in the National Library at Florence includes several made by Englishmen, and two of the most important of these have been described and reproduced on a small scale by Giuseppe Caraci in Olschki's periodical *La Bibliofilia* (Anno XXVI., Disp. 8ª—9ª). A reprint of the article has been received from the author, and through the kindness of Mr. Edward Berry of Bordighera we have also received excellent photographs of the two charts on a much less reduced scale, which permit all the details to be read with ease. The first chart is signed merely with the initials R.B., and the maker whose name they represent can only be guessed at. The chart (which covers the South Atlantic, with a small part of West Africa and the whole eastern coast of South America) lacks the decorative additions commonly found on sixteenth-century documents of the kind, and seems to have been specially made to illustrate the results of a particular voyage—that of Cavendish (his first) completed in 1588. This is indicated by the care bestowed on the delineation of the South American coast from Cape Frio downwards to the Strait of Magellan (the latter part being shown by an inset on a larger scale than the main map) and the distinctive coloration of this same part of the coast-line; Cape Frio being the first point on this coast touched at by Cavendish on his first expedition, and the first name in the list of latitudes recorded by Hakluyt on the authority of Fuller, Master of the *Desire*; moreover, the latitudes shown agree exactly with those of Fuller. It might therefore be supposed that the owner of the initials R.B. had accompanied Cavendish on this voyage, but no name corresponding to them appears in the recorded lists. On the other hand, both a Richard Bush and a Robert Burnet took part in Merick's expedition of 1589–90 to the same part of the world, Burnet being Master of the *Delight* of Bristol.

The second chart bears the signature of Gabriel Tatton, already known for several works of the kind, either printed or MS., preserved at the British Museum and elsewhere, one (made in London in 1602) being now at Florence like the present specimen. The inscription giving the maker's name is in Dutch: "Bij mijn Gabriell Tatton van London Englishman"—and as the scale is also in Dutch miles only, there seems little doubt it was made in Holland or at least for use there. It is a fine specimen of such work, fully coloured and decorated, and is in excellent preservation. The area embraced is the Pacific Ocean, with Asia east of the Indus, Central and North America as far

east as Florida, and the west coast of South America. Special attention is given to the delineation of the Malay Archipelago with New Guinea and the Solomon Islands, the chart (or its prototype) being one of the first to show the results of Mendaña's voyage of 1567–69. To the south there is the hypothetical coast-line of the Terra Australis, and in the north the Strait of Anian with a long hypothetical coast to the east extending to Nova Albion and California. In the drawing and nomenclature of the Archipelago there is a strong resemblance with the well-known map of Linschoten (1596), due no doubt to the use of common sources such as the maps of Vaz Dourado and Laso. As there is no trace of the results of Mendaña's second voyage of 1595, Tatton's chart, or the original from which it was copied, was probably drawn before that date. It measures 117·5 × 72 cm.

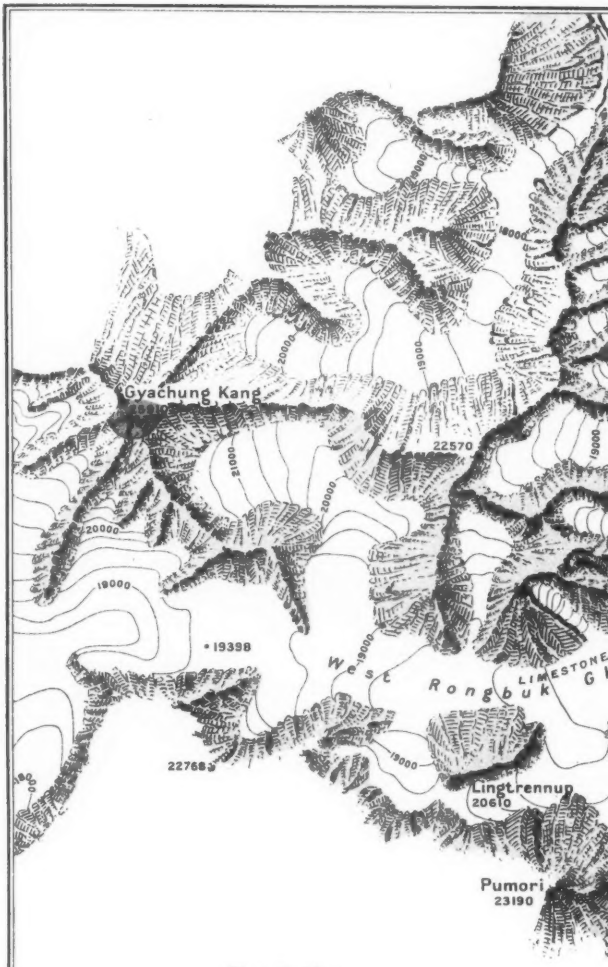
Honour to Dr. E. R. Heath.

We learn with pleasure that membership of the "Order of the Condor," newly founded in Bolivia in honour of the centenary of the Republic's Independence, has been conferred on Dr. Edwin R. Heath, whose explorations of the almost unknown river Beni (one of the main headstreams of the Madeira) brought him into favourable notice among geographers many years ago. Carried out at his own expense in 1880–81 in the face of great difficulties, they were described in a paper printed in the *Proceedings R.G.S.* for June 1883. Dr. Heath is now eighty-six years old, and lives at Kansas City, Missouri. His name, it will be remembered, has been bestowed upon a river in the Amazon basin not far from the scene of his own explorations, which enters the Madre de Dios from the south a little east of 69° W. long. (See the account of its survey by Col. Fawcett in *Geogr. Jour.*, 37, 377.)

OBITUARY

Sir George Taubman Goldie, K.C.M.G., F.R.S., D.C.L.

IT is with the deepest regret that we record the death on August 20 of Sir George Taubman Goldie, who as President of the Society from 1905 to 1908 won the high regard both of the Fellows and permanent staff for the efficient way in which he carried out the duties of that office and his whole-hearted devotion to the Society's interests. The achievement of Sir George Goldie's career was the creation of the Nigerian Protectorate on his own initiative and through private enterprise, in the face of very considerable obstacles abroad and apathy at home. For twenty-three years, from his first visit in 1877 to the taking over of the administration of Nigeria by the Imperial Government in 1900, all his energies were bent upon that object. On the winding-up of the Niger Company, Sir George Goldie held many public offices in succession. In 1903 he visited Rhodesia and drew up a scheme for the self-government of that territory; and from 1908 to 1919 he served on the London County Council as Chairman of the Finance Committee. Besides serving the Society as member of the Council and eventually as President, he acted as its Foreign Secretary from 1911 to 1921. We hope to publish a memoir of Sir George Goldie in the November number of the *Journal*.

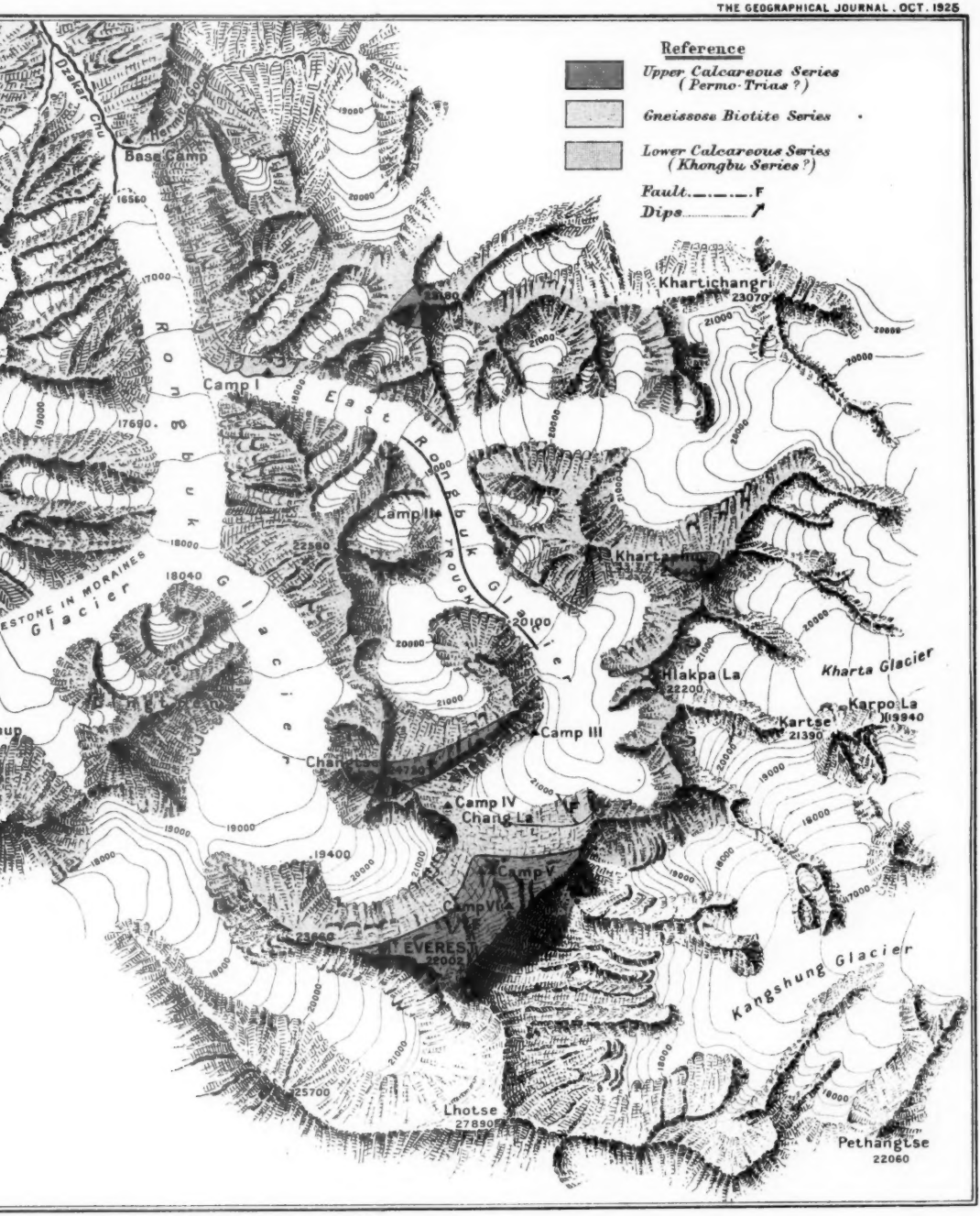


Sketch Map
of
MOUNT EVEREST
from surveys of the Expeditions of 1921 and 1924.

With GEOLOGY added by
N. E. Odell.

Scale of Miles
1 ½ 0 1 2 3

Heights in feet
Camp ▲
Pass =



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EVEREST - GEOLOGY
Odell